PB82-231275

Dual Alkali Acceptance Test at Louisville Gas and Electric Company; Volume II Appendices D-F

Bechtel Corp.
San Francisco, CA

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

Sep 81

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

EPA-600/7-81-159b

September 1981

PB82-231275

EPA

Research and Development

DUAL ALKALI ACCEPTANCE TEST
AT LOUISVILLE GAS AND ELECTRIC
COMPANY; VOLUME II.
APPENDICES D-F

Prepared for

Office of Air Quality Planning and Standards
Office of Environmental Engineering and Technology

Prepared by

Industrial Environmental Research
Laboratory
Research Triangle Park NC 27711

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-600/7-81-159b	2.	3. RECIPIENT'S ACCESSION NO. PB82 231275
4. TITLE AND SUBTITLE Dual Alkali Acceptance Test at Louisville Gas and Electric Company; Volume II. Appendices D-F		5. REPORT DATE September 1981
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) D. Watson, T. Martin, J. Donnelly, and N. Zoueshtiagh (Bechtel); R. VanNess (LG/E); C. LaMantia and L. Woodland (ADL); and R. Tussey (Kenvirons)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Bechtel National, Inc. P.O. Box 3965 San Francisco, California 94119		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. 68-02-2634
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Phase III Final; 4/79-7/80
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Norman Kaplan, Mail Drop 61; 919/541-2556. This is Phase III report: EPA-600/7-79-221a and -221b cover Phase II; EPA-600/7-78-010 and -010a cover Phase I.

16. ABSTRACT The report gives results of the completed acceptance test series run on the dual alkali system serving Louisville Gas and Electric Company's Cane Run Unit 6 boiler. Test results, measuring system performence, included: (1) SO2 removal averaged 94% and 143 ppm outlet concentration; (2) soda ash consumption averaged 0.042 mole soda ash per mole SO2 removed; (3) lime consumtpion averaged 1.04 mole CaO per mole SO2 removed; (4) power consumption averaged 1.05% of generation; (5) filter cake solids averaged 52.2 wt % insoluble solids; and (6) there was no net particulate matter addition. Various problems attributable to the boiler, the FGD system, and the quality and quantity of the carbide lime supplied to the system delayed acceptance testing until July 1980. The year-long demonstration period officially started in May 1980. The problems experienced and their solutions are discussed. Volume I discusses the test and contains Appendices A-C. This volume (Volume II) contains a discussion of the analytical and sampling methods, quality assurance, and the raw data gathered by Kenvirons. Volume III contains Appendices G-J.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Sulfur Dioxide	Pollution Control	13B	07B
Boilers	Sodium Carbonates	Stationary Sources	13A	
Flue Gases	Calcium Oxides	Dual Alkali System	21B	
Scrubbers	Dust	Particulate	07A,13I	11G
Desulfurization	Aerosols		07D	
Tests	Acceptability		14B	14G

18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 407
	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

EPA Form 2220-1 (9-73)

RESEARCH REPORTING SERIES

Research reports of the Office of Research and Development, U.S. Environmental Protection Agency, have been grouped into nine series. These nine broad categories were established to facilitate further development and application of environmental technology. Elimination of traditional grouping was consciously planned to foster technology transfer and a maximum interface in related fields. The nine series are:

1. Environmental Health Effects Research
2. Environmental Protection Technology
3. Ecological Research
4. Environmental Monitoring
5. Socioeconomic Environmental Studies
6. Scientific and Technical Assessment Reports (STAR)
7. Interagency Energy-Environment Research and Development
8. "Special" Reports
9. Miscellaneous Reports

This report has been assigned to the INTERAGENCY ENERGY-ENVIRONMENT RESEARCH AND DEVELOPMENT series. Reports in this series result from the effort funded under the 17-agency Federal Energy/Environment Research and Development Program. These studies relate to EPA's mission to protect the public health and welfare from adverse effects of pollutants associated with energy systems. The goal of the Program is to assure the rapid development of domestic energy supplies in an environmentally-compatible manner by providing the necessary environmental data and control technology. Investigations include analyses of the transport of energy-related pollutants and their health and ecological effects; assessments of, and development of, control technologies for energy systems; and integrated assessments of a wide range of energy-related environmental issues.

EPA REVIEW NOTICE

This report has been reviewed by the participating Federal Agencies, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Government, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

EPA-600/7-81-159b
September 1981

DUAL ALKALI ACCEPTANCE TEST AT LOUISVILLE GAS AND ELECTRIC COMPANY

VOLUME II

Appendices D-F

by

D.A. Watson, T.M. Martin, J.K. Donnelly, N. Zoueshtiagh
Bechtel National, Inc.
50 Beale St.
San Francisco, CA 94119

R.P. Van Ness
Louisville Gas and Electric Company
311 W. Chestnut Street
Louisville, KY 40201

C.R. La Mantia, L.R. Woodland
Arthur D. Little, Inc.
20 Acorn Park
Cambridge, MA 02140

Contract Nos. 68-02-2189 and 68-02-2634

EPA Project Officer: Norman Kaplan

Industrial Environmental Research Laboratory
Office of Environmental Engineering and Technology
Research Triangle Park, N. C. 27711

Prepared For:

U.S. Environmental Protection Agency
Office of Research and Development
Washington, D.C. 20460

PREFACE

Volumes II and III of this report contain the results of the stack sampling for particulate matter and sulfur dioxide emissions conducted by Kenvirons, Inc. under subcontract to Bechtel National, Inc. Volume II contains Kenviron's test program description, summary of results, field data forms and a portion of the preliminary calculation sheets. Volume III contains the remainder of the calculation sheets and summary forms.

TABLE OF CONTENTS

		Page
	PREFACE	ii
	TABLE OF CONTENTS	iii
	LIST OF TABLES AND FIGURES	v
Volume II		
Appendix D		
Section		
1.0	INTRODUCTION	D-1
2.0	SUMMARY OF RESULTS	D-4
3.0	TESTING PROCEDURES	D-11
3.1	Sample Locations	D-11
3.1.1	ESP Outlet (A & B)	D-11
3.1.2	Stack	D-13
3.2	Sampling and Analysis Methods	D-13
3.2.1	Particulate and SO_2 Sampling	D-13
3.2.2	Sample Recovery an	
3.2.2.1	Particulates	D-20
3.2.2.2	SO_2	D-23
3.2.3	Carrier Gas Sampling and Analysis	D-25
3.3	Daily Log Discussion	D-25
4.0	DATA REDUCTION	D-32
5.0	QUALITY ASSURANCE	D-33
6.0	DISCUSSION	D-35
Appendix E	FIELD DATA FORMS	E-1
Appendix F	ANALYTICAL-PARTICULATE	F-1

Volume III

Appendices		Page
G	ANALYTICAL - SO_2	G-1
H	PRELIMINARY PARTICULATE CALCULATIONS	H-1
I	FINAL COMPUTER CALCULATIONS	I-1
J	CALIBRATION DATA	J-1

TABLES

No.		Page
1	TEST SCHEDULE	D-2
2	TEST RESULTS SUMMARY	D-5
3	RESULTS: AVERAGE AND RANGE	D-9
4	TEST LOCATION CHARACTERISTICS	D-11
5	COORDINATION CODE	D-21
6	PARTICULATE SAMPLE DISTRIBUTION EVALUATION	D-36
7	COLLECTION EFFICIENCIES	D-37

FIGURES

No.		Page
1	PLAN VIEW OF TEST LOCATIONS	D-12
2	ESP OUTLET SIDE VIEW	D-14
3	ESP OUTLET FACE VIEW	D-15
4	STACK SIDE VIEW	D-16
5	STACK CROSS-SECTION	D-17
6	LEAR SIEGLER PM 100	D-18
7	METHOD 3 PROBE ATTACHMENT	D-26
8	INTEGRATED GAS TRAIN	D-27

Appendix D. Kenvirons Tests

1.0 INTRODUCTION

Bechtel National, Inc. has been contracted by the Environmental Protection Agency (Contract No. 68-02-2634) to evaluate the Dual Alkali SO_2 control process on the Louisville Gas and Electric Company Cane Run Station Unit No. 6. Kenvirons, Inc. was subcontracted (Agreement No. 11975-2634-SF-3) to provide testing support services.

The first phase of testing, associated with the demonstration program, consists of an "Acceptance Test". Characteristics of this test, including process monitoring and testing, were presented in a Bechtel report entitled "Acceptance Test Plan", dated April, 1979.

Acceptance testing was originally scheduled for late 1978, then revised to October, 1979. On-going process problems delayed testing on a weekly basis. Testing was scheduled and performed during December 4 through 10, 1979; however, due to unacceptable equipment performance, such testing was designated informational. Kenvirons' test report for that work was submitted to Bechtel on July 9, 1980.

The official acceptance test was thus rescheduled after correcting equipment problems. Testing, which is the basis of this report, was performed during July 17 through 26, 1980.

On the basis of a Bechtel test plan scope, Kenvirons prepared a detailed "Work Plan" dated May, 1980, that described test methods and locations, sampling equipment analysis procedures, etc., in fulfillment of subcontract terms. That plan is incorporated herein by reference since few changes were made.

The Acceptance Test essentially required ten straight days of proper system operation. Financial reimbursement to various participating parties was at stake per the acceptance test. The Kenvirons effort required simultaneous sampling at three different varying locations between the boiler and stack for ten straight days. Particulate and SO_2 mass flows using EPA Method 5-8 were measured at each location. See Table 1 for the test schedule.

Mr. A. Abdulsattar served as Project Manager for Bechtel until June, 1980. Mr. Dave Watson replaced Mr. Abdulsattar as Project Manager prior to testing. Mr. Watson was assisted on-site by Mr. Mickey Martin and Mr. John Donnelly.

Mr. Bob Van Ness served as coordinator for L G & E. Mr. Bud Carter served as project engineer. They were assisted by Mr. Rick Melloan and Ms. Mary Pederson. Mr. Bob Miles and Mr. Terry Rausch served as expediters. We sincerely appreciate the assistance and hospitality offered by L G & E.

Mr. Norman Kaplan served as Project Officer for EPA.

TABLE 1

TEST SCHEDULE

DAY	DATE	TEAM 1	TEAM 2	TEAM 3
1	7-17-80	STACK	ESP-A Outlet	ESP-B Outlet
2	7-18-80	STACK	ESP-A Outlet	ESP-B Outlet
3	7-19-80	STACK	ESP-A Outlet	ESP-B Outlet
4	7-20-80	STACK	ESP-A Outlet	ESP-B Outlet
5	7-21-80	STACK	ESP-A Outlet	ESP-B Outlet
6	7-22-80	STACK	ESP-A Outlet	ESP-B Outlet
7	7-23-80	STACK	ESP-A Outlet	ESP-B Outlet
8	7-24-80	STACK	ESP-A Outlet	ESP-B Outlet
9	7-25-80	STACK	ESP-A Outlet	ESP-B Outlet
10	7-26-80	STACK	ESP-A Outlet	ESP-B Outlet

Mr. Robert C. Tussey, Jr. served as Principal Investigator for Kenvirons. Dr. Gary Revlett served as analytical coordinator and team leader at the stack. He was assisted by Mr. Parker Moore. Mr. Ron Tussey served as team leader at the ESP-B location. He was assisted by Mr. Paul Ramp and Ms. Donna Blankenship. Mr. Bud Lauritzen served as team leader at the ESP-A location. He was assisted by Mr. Jeff Bralley. Mr. Paul Ramp and Ms. Donna Blankenship, along with Dr. Gary Revlett, performed all sample analysis for Kenvirons. Mr. Bralley performed computer data reduction. Mr. R. S. and R. C. Tussey, Jr. co-authored this report.

2.0 SUMMARY OF RESULTS

Table 2 presents a summary of results for all 30 test runs. As previously indicated, three simultaneous runs were made each day at three different locations by three teams. The following example explains the run code: run BEC-STK-1 is stack run 1 while run BEC-ESP-A-2 is ESP outlet A-side, run number 2 and BEC-ESP-B-3 is ESP outlet B-side, run number 3.

Particulate emission rate is presented as gr/DSCF, gr/ ACF, lb/hour, and lb/MMBTU. SO_2 results are presented as lb/DSCF, lb/ACF, lb/hour, lb/MMBTU and PPM.

Due to intentional variability in process operation each day, we cannot evaluate or discuss in detail, day-to-day comparative test results. Our discussion is limited to probability of accurate and representative samples.

Table 2 presents both sampling data averages and emission calculation results. Particulate emission rates are presented as grains per dry standard cubic foot (Gr/DSCF), pounds per DSCF, grains per actual cubic foot (Gr/ACF), pounds per hour (LB/Hr), and pounds per million British Thermal Units (LB/MMBTU). Sulfur dioxide emission rates are presented as (LB/MMBTU), and parts per million standard dry (PPM) and parts per million stack conditions.

Table 3 presents a summary (from Table 2) of results, average and range, for pertinent variables. Most results were within expected ranges. A brief discussion of averages and ranges follows.

*Our isokinetic sampling rate was within the method-specified range of 100% ± 10% for all runs except STK002 (11.6%). The slightly out of range rate that day was due to a significantly higher % Moisture content (15.0%) compared to the first run at the stack (8.8%). Since the rate was only 1.6% out of range, the results should not be significantly affected.

*The moisture content at the stack was low for day 1 (8.8%) but higher and consistent for the remaining days (13.7% - 15%). ESP A and B side moisture average was within about one-half percent and the range was less than three percent.

*Oxygen content at the stack was consistent (7.7% - 8.8%) as measured by Orsat. ESP A and B values were consistent, varying from 6.8% to 9.3% using a Fyrite. ESP A and B averages were very close at 7.75% and 7.88% respectively. The slightly higher stack value indicates air inleakage.

*Temperature at the stack varied from 167.8°F to 179.2°F, which is a reasonably low range. The ESP A average was higher (304.4°F) than the ESP B value (293.47°F) by about 12°F. The ESP B range was 25°F and the ESP A range was 13°F.

*ESP B velocity (2099 FPM) was lower than ESP A (2232 FPM). ESP B range was higher (500) than ESP A (200 FPM). Stack velocity range was 300 FPM.

TABLE 2
TEST RESULTS SUMMARY

OUTPUT DATE - 08/27/80
TIME - 14:30:51

KENVIRONS, INC.
PROJECT NO. 80019

BECHTEL 1980 DEMO-ACCEPTANCE TEST - LOIE CANE RUN NO.6

PARTICULATE AND SO2 EMISSION DATA

NAME	DESCRIPTION	UNITS	(1)			(2)			(3)		
	TITLE OF RUN		ESPA01	ESPB01	STK001	ESPA02	ESPB02	STK002	ESPA03	ESPB03	STK003
	DATE OF RUN		07/17/80	07/17/80	07/17/80	07/18/80	07/18/80	07/18/80	07/19/80	07/19/80	07/19/80
	TIME OF RUN		1428-1724	1428-1655	1422-1702	1100-1338	1115-1342	1100-1301	1036-1302	1035-1307	1040-1231
DN	PROBE TIP DIAMETER	IN	0.238	0.241	0.172	0.238	0.241	0.172	0.238	0.241	0.172
TT	NET TIME OF RUN	MIN	100.0	100.0	84.0	100.0	100.0	84.0	100.0	100.0	84.0
NP	NUMBER OF SAMPLING POINTS		50	50	28	50	50	28	50	50	28
Y	DRY GAS METER CALIB. FACTOR		1.0240	1.0370	1.0170	1.0250	1.0360	1.0175	1.0250	1.0390	1.0158
PB	BAROMETRIC PRES, LAB	IN.HG	29.66	29.66	29.66	29.80	29.80	29.80	29.86	29.86	29.86
PBC	BAROMETRIC PRES, CONSOLE	IN.HG	29.61	29.61	29.44	29.75	29.75	29.58	29.81	29.81	29.64
PM	AVG ORF PRES DROP	IN.H2O	0.580	0.706	0.532	0.640	0.647	0.577	0.652	0.790	0.487
VM	VOL DRY GAS-METER COND	DCF	42.60	48.70	36.18	44.11	45.99	37.82	45.59	51.15	34.77
TM	AVG GAS METER TEMP	DEG.F	104.8	126.4	114.0	104.1	125.1	112.4	107.0	116.9	112.2
VMSTD	VOL DRY GAS-STD COND	DSCF	40.41	45.07	33.34	42.14	42.81	35.14	43.42	48.56	32.32
VW	TOTAL H2O COLLECTED	ML	81.1	89.5	68.1	91.6	93.9	131.5	97.9	94.9	113.0
VWV	VOL H2O VAPOR-STD COND	SCF	3.82	4.21	3.21	4.31	4.42	6.19	4.61	4.47	5.32
PMOS	PERCENT MOISTURE BY VOLUME		8.6	8.5	8.8	9.3	9.4	15.0	9.6	8.4	14.1
MD	MOLE FRACTION DRY GAS		0.914	0.915	0.912	0.907	0.906	0.850	0.904	0.916	0.859
PCO2	PERCENT CO2 BY VOLUME, DRY		12.0	12.0	10.4	12.0	12.3	10.8	11.5	11.8	10.4
PO2	PERCENT O2 BY VOLUME, DRY		7.7	7.3	8.8	7.5	6.8	8.3	7.8	7.8	8.7
PCO	PERCENT CO BY VOLUME, DRY		0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
PN2	PERCENT N2 BY VOLUME, DRY		80.3	80.7	80.6	80.5	80.8	80.8	80.8	80.5	80.9
MWD	MOLECULAR WT-DRY STK GAS		30.23	30.21	30.02	30.22	30.25	30.06	30.15	30.19	30.01
MW	MOLECULAR WT-STK GAS		29.17	29.17	28.96	29.09	29.10	28.26	28.99	29.16	28.32
CP	PITOT TUBE COEFFICIENT		0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840
DPS	AVG SQRT STK VEL HEAD	IN.H2O	0.522	0.560	0.844	0.548	0.509	0.887	0.557	0.571	0.854
TS	AVG STACK TEMPERATURE	DEG.F	300.1	283.4	169.2	311.5	304.1	175.0	309.7	294.5	175.8
PS	STACK PRESSURE, ABSOLUTE	IN.HG	28.46	28.50	29.38	28.64	28.64	29.52	28.69	28.70	29.58
VS	AVG STACK GAS VELOCITY	FPM	2150	2280	3120	2270	2100	3330	2310	2340	3210
AS	STACK AREA	IN2	33618	33618	40828	33618	33618	40828	33618	33618	40828
QS	STK FLOWRATE, DRY, STD	DSCFM	303000	329000	666000	315000	294000	659000	321000	335000	641000
QA	ACTUAL STACK FLOWRATE	ACFM	502000	532000	886000	530000	490000	945000	539000	545000	909000
PERI	PERCENT ISOKINETIC		100.7	100.9	104.7	101.0	107.4	111.6	102.3	106.8	105.5
MT	PARTICULATE WT-TOTAL	MG	628.70	962.90	79.80	822.10	482.50	90.90	1194.70	1515.90	96.70
CAN	PART. LOAD-TTL, STD	GR/DSCF	0.240	0.330	0.037	0.301	0.174	0.040	0.425	0.482	0.046
C	PART. LOAD-TTL, STD	LB/DSCF	.00003430	.00004710	.00000527	.00004300	.00002480	.00000570	.00006070	.00006880	.00000659
CAT	PART. LOAD-TTL, STK	GR/ACF	0.145	0.204	0.028	0.179	0.104	0.028	0.252	0.296	0.033
CAW	PART. EMIS-TOTAL	LB/HR	624.0000	930.0000	211.0000	813.0000	438.0000	225.0000	1167.1276	1384.0506	254.0000
E	EMISSION RATE	LB/MMBTU	0.5320	0.7120	0.0895	0.6590	0.3620	0.0932	0.9470	1.0700	0.1110
F	F FACTOR	DSCF/MMBTU	9820	9820	9820	9820	9820	9820	9820	9820	9820
SCONC	SO2, CONC., STD	LB/DSCF	3.86E-04	3.86E-04	2.05E-05	3.57E-04	3.61E-04	2.71E-05	3.66E-04	3.80E-04	2.56E-05
SCONCA	SO2, CONC., STK	LB/ACF	2.33E-04	2.39E-04	1.54E-05	2.12E-04	2.16E-04	1.89E-05	2.18E-04	2.34E-04	1.80E-05
SCHR	SO2 EMISSION RATE	LB/HR	7028.138	7627.597	819.000	6752.409	6359.639	1069.728	7051.010	7645.321	983.000
SCHM	SO2 EMISSION RATE	LB/MMBTU	5.990	5.840	0.348	5.470	5.260	0.442	5.720	5.930	0.430
SCPPM	SO2, CONC., STD	PPM	2330	2330	124	2150	2180	163	2210	2290	154
SCPPMA	SO2, CONC., STK	PPM	2130	2130	113	1950	1970	139	2000	2100	133

TABLE 2 (Cont.)

OUTPUT DATE - 08/27/80
TIME - 14:30:51

KENVIRONS, INC.
PROJECT NO. 80019

BECHTEL 1980 DEMO-ACCEPTANCE TEST - LOIE CANE RUN NO.6

PARTICULATE AND SO2 EMISSION DATA

NAME	DESCRIPTION	UNITS	(4)			(5)			(6)		
	TITLE OF RUN		ESPA04	ESPB04	STK004	ESPA05	ESPB05	STK005	ESPA06	ESPB06	STK006
	DATE OF RUN		07/20/80	07/20/80	07/20/80	07/21/80	07/21/80	07/21/80	07/22/80	07/22/80	07/22/80
	TIME OF RUN		1230-1454	1230-1448	1235-1424	1030-1243	1030-1233	1030-1219	1104-1338	1109-1416	1035-1216
DN	PROBE TIP DIAMETER	IN	0.238	0.241	0.172	0.238	0.241	0.172	0.238	0.241	0.172
TT	NET TIME OF RUN	MIN	100.0	100.0	84.0	100.0	100.0	84.0	100.0	100.0	84.0
NP	NUMBER OF SAMPLING POINTS		50	50	28	50	50	28	50	50	28
Y	DRY GAS METER CALIB. FACTOR		1.0245	1.0355	1.0155	1.0250	1.0350	1.0155	1.0245	1.0350	1.0145
PB	BAROMETRIC PRES, LAB	IN.HG	29.85	29.85	29.85	29.88	29.88	29.88	29.79	29.79	29.79
PBC	BAROMETRIC PRES, CONSOLE	IN.HG	29.80	29.80	29.63	29.83	29.83	29.66	29.74	29.74	29.57
PM	AVG ORF PRES DROP	IN.H2O	0.621	0.634	0.478	0.648	0.613	0.462	0.607	0.613	0.440
VM	VOL DRY GAS-METER COND	DCF	44.76	45.23	34.49	45.96	44.19	33.86	44.24	43.12	32.82
TM	AVG GAS METER TEMP	DEG.F	118.1	121.7	118.6	110.9	116.5	115.2	89.4	98.7	103.2
VMSTD	VOL DRY GAS-STD COND	DSCF	41.77	42.40	31.69	43.50	41.82	31.32	43.36	41.98	30.88
VW	TOTAL H2O COLLECTED	ML	96.0	68.5	115.7	102.5	97.3	115.1	108.6	101.8	111.7
VWV	VOL H2O VAPOR-STD COND	SCF	4.52	3.22	5.45	4.82	4.58	5.42	5.11	4.79	5.26
PMOS	PERCENT MOISTURE BY VOLUME		9.8	7.1	14.7	10.0	9.9	14.7	10.5	10.2	14.5
MD	MOLE FRACTION DRY GAS		0.902	0.929	0.853	0.900	0.901	0.853	0.895	0.898	0.855
PCO2	PERCENT CO2 BY VOLUME, DRY		12.8	12.1	10.8	12.8	13.0	10.7	11.1	11.5	11.1
PO2	PERCENT O2 BY VOLUME, DRY		8.5	9.0	8.2	7.8	8.3	8.1	8.1	8.0	7.7
PCO	PERCENT CO BY VOLUME, DRY		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PN2	PERCENT N2 BY VOLUME, DRY		78.8	78.9	81.0	79.5	78.7	81.2	80.8	80.5	81.2
MWD	MOLECULAR WT-DRY STK GAS		30.38	30.30	30.06	30.35	30.41	30.03	30.10	30.16	30.08
MW	MOLECULAR WT-STK GAS		29.17	29.43	28.29	29.12	29.19	28.26	28.83	28.92	28.32
CP	PITOT TUBE COEFFICIENT		0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840
DPS	AVG SQRT STK VEL HEAD	IN.H2O	0.541	0.504	0.855	0.563	0.500	0.855	0.546	0.523	0.851
TS	AVG STACK TEMPERATURE	DEG.F	301.2	280.4	179.2	308.9	305.3	174.3	298.0	300.8	175.9
PS	STACK PRESSURE, ABSOLUTE	IN.HG	28.75	28.75	29.57	28.73	28.73	29.60	28.67	28.67	29.51
VS	AVG STACK GAS VELOCITY	FPM	2220	2030	3220	2320	2060	3210	2250	2160	3200
AS	STACK AREA	IN2	33618	33618	40828	33618	33618	40828	33618	33618	40828
QS	STK FLOWRATE, DRY, STD	DSCFM	311000	302000	636000	322000	287000	638000	314000	301000	635000
QA	ACTUAL STACK FLOWRATE	ACFM	518000	474000	913000	542000	480000	909000	526000	504000	907000
PERI	PERCENT ISOKINETIC		101.3	103.5	104.2	102.1	107.5	102.6	104.3	102.8	101.8
MT	PARTICULATE WT-TOTAL	MG	1080.90	899.40	91.20	1397.10	1068.60	90.30	1212.20	1788.20	91.30
CAN	PART. LOAD-TTL, STD	GR/DSCF	0.399	0.327	0.044	0.496	0.394	0.044	0.431	0.657	0.046
C	PART. LOAD-TTL, STD	LB/DSCF	.00005700	.00004680	.00000634	.00007080	.00005630	.00000635	.00006160	.00009390	.00000651
CAT	PART. LOAD-TTL, STK	GR/ACF	0.240	0.208	0.031	0.294	0.235	0.031	0.258	0.392	0.032
CAW	PART. EMIS-TOTAL	LB/HR	1066.0365	847.0000	242.0000	1367.5283	969.0000	243.0000	1161.2044	1695.5126	248.0000
E	EMISSION RATE	LB/MMBTU	0.9440	0.8060	0.1030	1.1100	0.9200	0.1020	0.9900	1.4900	0.1020
F	F FACTOR	DSCF/MMBTU	9820	9820	9820	9820	9820	9820	9820	9820	9820
SCONC	SO2, CONC., STD	LB/DSCF	3.96E-04	4.10E-04	2.63E-05	3.87E-04	3.99E-04	2.27E-05	3.90E-04	4.11E-04	4.11E-05
SCONCA	SO2, CONC., STK	LB/ACF	2.38E-04	2.61E-04	1.83E-05	2.30E-04	2.38E-04	1.59E-05	2.33E-04	2.45E-04	2.88E-05
SCHR	SO2 EMISSION RATE	LB/HR	7394.102	7437.808	1003.707	7474.553	6860.159	870.000	7343.135	7420.226	1564.931
SCMM	SO2 EMISSION RATE	LB/MMBTU	6.550	7.080	0.425	6.040	6.510	0.364	6.260	6.540	0.641
SCPPM	SO2, CONC., STD	PPM	2390	2480	159	2330	2410	137	2350	2480	248
SCPPMA	SO2, CONC., STK	PPM	2150	2300	135	2100	2170	117	2100	2230	212

TABLE 2 (Cont.)

OUTPUT DATE - 08/27/80
TIME - 14133:45

KENVIRONS, INC.
PROJECT NO. 80019

BECHTEL 1980 DEMO-ACCEPTANCE TEST - LGIE CANE RUN NO.6

PARTICULATE AND SO2 EMISSION DATA

NAME	DESCRIPTION	UNITS	(7) ESPA07 07/23/80 1620-1832	(7) ESPB07 07/23/80 1620-1823	(7) STK007 07/23/80 1620-1814	(8) ESPA08 07/24/80 1100-1310	(8) ESPB08 07/24/80 1100-1302	(8) STK008 07/24/80 1100-1244	(9) ESPA09 07/25/80 1145-1344	(9) ESPB09 07/25/80 1145-1350	(9) STK009 07/25/80 1145-1321
	TITLE OF RUN										
	DATE OF RUN										
	TIME OF RUN										
DN	PROBE TIP DIAMETER	IN	0.238	0.241	0.172	0.238	0.241	0.172	0.238	0.241	0.172
TT	NET TIME OF RUN	MIN	100.0	100.0	84.0	100.0	100.0	84.0	100.0	100.0	84.0
NP	NUMBER OF SAMPLING POINTS		50	50	28	50	50	28	50	50	28
Y	DRY GAS METER CALIB. FACTOR		1.0230	1.0320	1.0115	1.0245	1.0340	1.0130	1.0240	1.0338	1.0135
PB	BAROMETRIC PRES, LAB	IN.HG	29.80	29.80	29.80	29.82	29.82	29.82	29.84	29.84	29.84
PBC	BAROMETRIC PRES, CONSOLE	IN.HG	29.75	29.75	29.58	29.77	29.77	29.60	29.79	29.79	29.62
PM	AVG ORF PRES DROP	IN.H20	0.535	0.450	0.364	0.607	0.563	0.397	0.590	0.542	0.437
VM	VOL DRY GAS-METER COND	DCF	41.87	39.70	29.43	44.31	42.69	30.98	43.53	42.35	33.01
TM	AVG GAS METER TEMP	DEG.F	94.7	111.8	102.2	93.5	107.9	100.3	98.9	113.6	104.7
VMSTD	VOL DRY GAS-STD COND	DSCF	40.58	37.65	27.66	43.14	40.89	29.28	41.99	40.17	31.00
VW	TOTAL H20 COLLECTED	ML	90.0	80.8	93.2	107.5	99.3	109.1	95.9	87.2	110.0
VWV	VOL H20 VAPOR-STD COND	SCF	4.24	3.80	4.39	5.06	4.67	5.14	4.51	4.10	5.18
PWOS	PERCENT MOISTURE BY VOLUME		9.5	9.2	13.7	10.5	10.3	14.9	9.7	9.3	14.3
MD	MOLE FRACTION DRY GAS		0.905	0.908	0.863	0.895	0.897	0.851	0.903	0.907	0.857
PCO2	PERCENT CO2 BY VOLUME, DRY		10.7	11.5	10.5	11.2	11.5	10.8	11.1	9.3	10.7
PO2	PERCENT O2 BY VOLUME, DRY		7.3	7.8	7.8	7.3	7.2	7.7	8.5	9.3	7.9
PCO	PERCENT CO BY VOLUME, DRY		0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
PN2	PERCENT N2 BY VOLUME, DRY		82.0	80.7	81.5	81.5	81.3	81.4	80.4	81.5	81.4
MWD	MOLECULAR WT-DRY STK GAS		30.00	30.15	30.00	30.08	30.13	30.04	30.12	29.85	30.03
MW	MOLECULAR WT-STK GAS		28.87	29.04	28.36	28.81	28.88	28.25	28.95	28.75	28.31
CP	PITOT TUBE COEFFICIENT		0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840
DPS	AVG SQRT STK VEL HEAD	IN.H20	0.516	0.449	0.785	0.549	0.512	0.821	0.541	0.492	0.860
TS	AVG STACK TEMPERATURE	DEG.F	304.5	284.6	170.7	309.3	294.9	167.8	300.4	294.8	174.7
PS	STACK PRESSURE, ABSOLUTE	IN.HG	28.80	28.82	29.52	28.72	28.65	29.55	28.74	28.74	29.57
VS	AVG STACK GAS VELOCITY	FPM	2130	1820	2930	2280	2110	3070	2230	2030	3220
AS	STACK AREA	IN2	33618	33618	40828	33618	33618	40828	33618	33618	40828
QS	STK FLOWRATE, DRY, STD	DSCFM	300000	264000	593000	314000	296000	614000	313000	288000	644000
QA	ACTUAL STACK FLOWRATE	ACFM	498000	426000	832000	532000	492000	869000	521000	473000	914000
PERI	PERCENT ISOKINETIC		102.4	105.0	97.6	103.9	102.0	99.7	101.2	102.7	100.7
MT	PARTICULATE WT-TOTAL	MG	718.50	921.70	81.10	808.50	805.60	76.30	907.40	1242.00	98.40
CAN	PART. LOAD-TTL, STD	GR/DSCF	0.273	0.378	0.045	0.289	0.304	0.040	0.334	0.477	0.049
C	PART. LOAD-TTL, STD	LB/DSCF	.00003900	.00005400	.00000646	.00004130	.00004340	.00000574	.00004760	.00006820	.00000699
CAT	PART. LOAD-TTL, STK	GR/ACF	0.164	0.234	0.032	0.170	0.183	0.028	0.201	0.291	0.035
CAW	PART. EMIS-TOTAL	LB/HR	701.0000	856.0000	230.0000	778.0000	770.0000	212.0000	876.0000	1178.8716	270.0000
E	EMISSION RATE	LB/MMBTU	0.5890	0.8470	0.1020	0.6250	0.6490	0.0893	0.7890	1.2000	0.1100
F	F FACTOR	DSCF/MMBTU	9820	9820	9820	9820	9820	9820	9820	9820	9820
SCONC	SO2, CONC., STD	LB/DSCF	3.38E-04	3.37E-04	2.27E-05	3.52E-04	3.47E-04	2.15E-05	4.19E-04	4.06E-04	2.21E-05
SCONCA	SO2, CONC., STK	LB/ACF	2.03E-04	2.09E-04	1.62E-05	2.08E-04	2.09E-04	1.52E-05	2.52E-04	2.47E-04	1.56E-05
SCHR	SO2 EMISSION RATE	LB/HR	6073.866	5338.111	807.000	6629.854	6158.371	794.000	7876.590	7019.656	854.000
SCHM	SO2 EMISSION RATE	LB/MMBTU	5.100	5.290	0.357	5.330	5.190	0.335	6.930	7.150	0.349
SCPPM	SO2, CONC., STD	PPM	2040	2030	137	2120	2100	130	2530	2450	133
SCPPMA	SO2, CONC., STK	PPM	1850	1840	118	1900	1880	111	2280	2220	114

TABLE 2 (Cont.)

OUTPUT DATE - 08/27/80
TIME - 14:33:45

KENVIRONS, INC.
PROJECT NO. 80019

BECHTEL 1980 DEMO-ACCEPTANCE TEST - LGIE CANE RUN NO.6

PARTICULATE AND SO2 EMISSION DATA

(10)

NAME	DESCRIPTION	UNITS			
	TITLE OF RUN		ESPA10	ESPB10	STK010
	DATE OF RUN		07/26/80	07/26/80	07/26/80
	TIME OF RUN		0930-1138	0930-1129	0935-1116
DN	PROBE TIP DIAMETER	IN	0.238	0.241	0.172
TT	NET TIME OF RUN	MIN	100.0	100.0	84.0
NP	NUMBER OF SAMPLING POINTS		50	50	28
Y	DRY GAS METER CALIB. FACTOR		1.0235	1.0340	1.0130
PB	BAROMETRIC PRES, LAB	IN.HG	29.78	29.78	29.78
PBC	BAROMETRIC PRES, CONSOLE	IN.HG	29.73	29.73	29.56
PM	AVG ORF PRES DROP	IN.H2O	0.561	0.550	0.398
VM	VOL DRY GAS-METER COND	DCF	42.84	41.53	31.38
TM	AVG GAS METER TEMP	DEG.F	99.4	108.3	105.1
VMSTD	VOL DRY GAS-STD COND	DSCF	41.18	39.70	29.37
VW	TOTAL H2O COLLECTED	ML	92.9	86.5	100.6
VWV	VOL H2O VAPOR-STD COND	SCF	4.37	4.07	4.74
PMOS	PERCENT MOISTURE BY VOLUME		9.6	9.3	13.9
MD	MOLE FRACTION DRY GAS		0.904	0.907	0.861
PCO2	PERCENT CO2 BY VOLUME, DRY		11.5	12.8	10.7
PO2	PERCENT O2 BY VOLUME, DRY		7.0	7.3	7.9
PCO	PERCENT CO BY VOLUME, DRY		0.0	0.0	0.1
PN2	PERCENT N2 BY VOLUME, DRY		81.5	80.0	81.3
MWD	MOLECULAR WT-DRY STK GAS		30.12	30.33	30.03
MW	MOLECULAR WT-STK GAS		28.96	29.18	28.36
CP	PITOT TUBE COEFFICIENT		0.840	0.840	0.840
DPS	AVG SQRT STK VEL HEAD	IN.H2O	0.523	0.499	0.823
TS	AVG STACK TEMPERATURE	DEG.F	300.4	291.9	172.5
PS	STACK PRESSURE, ABSOLUTE	IN.HG	28.57	28.64	29.50
VS	AVG STACK GAS VELOCITY	FPM	2160	2040	3080
AS	STACK AREA	IN2	33618	33618	40828
QS	STK FLOWRATE, DRY, STD	DSCFM	302000	290000	620000
QA	ACTUAL STACK FLOWRATE	ACFM	505000	476000	874000
PERI	PERCENT ISOKINETIC		102.9	100.9	99.2
MT	PARTICULATE WT-TOTAL	MG	1216.70	710.20	86.00
CAN	PART. LOAD-TTL, STD	GR/DSCF	0.456	0.276	0.045
C	PART. LOAD-TTL, STD	LB/DSCF	.00006510	.00003940	.00000645
CAT	PART. LOAD-TTL, STK	GR/ACF	0.273	0.168	0.032
CAW	PART. EMIS-TOTAL	LB/HR	1181.9692	686.0000	240.0000
E	EMISSION RATE	LB/MMBTU	0.9620	0.5930	0.1020
F	F FACTOR	DSCF/MMBTU	9820	9820	9820
SCONC	SO2, CONC., STD	LB/DSCF	4.00E-04	3.92E-04	2.27E-05
SCONCA	SO2, CONC., STK	LB/ACF	2.40E-04	2.39E-04	1.61E-05
SCHR	SO2 EMISSION RATE	LB/HR	7256.073	6816.098	845.000
SCMM	SO2 EMISSION RATE	LB/MMBTU	5.900	5.890	0.359
SCPPM	SO2, CONC., STD	PPM	2410	2360	137
SCPPMA	SO2, CONC., STK	PPM	2180	2140	118

TABLE 3

RESULTS AVERAGE AND RANGE

DESCRIPTION	AVERAGE			RANGE		
	ESP-A	ESP-B	STACK	ESP-A	ESP-B	STACK
1. % Moisture	9.71	9.16	13.86	8.60 - 10.50	7.10 - 10.30	8.80 - 15.00
2. % O_2	7.75	7.88	8.11	7.00 - 8.50	6.80 - 9.30	7.70 - 8.80
3. Stack Temperature (°F)	304.40	293.47	173.51	298.0 - 311.5	280.4 - 305.3	167.8 - 179.2
4. Velocity (FPM)	2232	2099	3159	2130 - 2320	1820 - 2340	2930 - 3330
5. Flow Rate (DSCFM)	311,500	298,600	634,600	300,000 - 322,000	264,000 - 335,000	593,000 - 666,000
6. Flow Rate (ACFM)	521,300	489,200	895,800	498,000 - 542,000	426,000 - 545,000	832,000 - 945,000
7. % Isokinetic	102.2	103.9	102.8	100.7 - 104.3	100.9 - 107.5	97.6 - 111.6
8. Particulate						
GR/DSCF	0.364	0.380	0.044	0.240 - 0.496	0.174 - 0.657	0.037 - 0.049
LB/HR	975.58	975.39	237.50	624 - 1367	438 - 1695	211 - 270
LB/MMBTU	0.8147	0.8642	0.1004	0.5320 - 1.110	0.3620 - 1.490	0.0893 - 0.1110
9. SO_2						
LB/HR	7088	6868	961	6073 - 7876	5338 - 7645	794 - 1565
LB/MMBTU	5.93	6.07	0.405	5.10 - 6.93	5.19 - 7.15	0.335 - 0.641
PPM (Dry Std.)	2286	2311	152	2040 - 2530	2030 - 2480	124 - 248

*Dry standard flow rate at the ESP B was less (298,600) than at the ESP A (311,500). Less total flow (311,500 + 298,600 = 610,100 DSCFM) was measured at the ESP than stack (634,600). The difference was less than 4% indicating good sampling and measuring performance.

*The average particulate emission rate at the ESP A and B was very close at 0.815 and 0.864 LB/MMBTU. The range at both locations, however, was very high (0.5 at A and 1.1 at B). The stack average was 0.1004 LB/MMBTU, which is essentially at the 1971 NSPS. The stack range was reasonably low (0.089 to 0.111). The average scrubber particulate collection efficiency was 88%. ESP outlet values are much higher than expected.

*The average SO_2 emission rate at the ESP A and B was very close at 5.93 and 6.07 LB/MMBTU. The stack rate was very low, averaging 0.405 LB/MMBTU, which is significantly below the 1971 NSPS (1.2). This gives an approximate scrubber SO_2 efficiency of 93%.

All calculations in Table 2 were performed once manually; then all data were entered into computer for final confirming calculation. Differences were resolved such that the final computer results should be essentially correct.

Appendix A presents copies of all raw field data forms; Appendix B presents particulate analytical results; Appendix C presents SO_2 analytical data; Appendix D presents particulate calculations; Appendix E presents computer calculations and Appendix F presents equipment calibrations.

3.0 TESTING PROCEDURES

3.1 Sample Locations

All testing was conducted at three locations in the ductwork between the ESP and stack (see Table 1). Figure 1 presents a plan view of the ESP, scrubber, and stack. The gas stream is split into two equal parts as it leaves the boiler. Thus, the ESP and scrubber consist of an "A" side (north) and "B" side (south) as illustrated. The ducts are connected to a common plenum after the ESP (before scrubber) to allow pressure balancing. Also, this plenum serves as a scrubber bypass duct. The three test locations are:

1. ESP Outlet "A"
2. ESP Outlet "B"
3. Stack

EPA Method 1 was used as a general guide in selecting the number and location of sample points. At the ESP location, compromises were made due to the lack of straight ductwork prior to ports. Generally, we targeted a minimum of 2 minutes per point, and approximately 50 points per duct for non Method 1 locations. Also, the sample representative area per point (length and width) dimension ratio should not exceed 2:1. The sample time per point was adjusted to allow a total time at all three locations for the day to be approximately simultaneous. Table 4 presents a summary of test location characteristics.

TABLE 4

Sample Location	No. Ports	Points Per Ports	Total Points	Minutes Per Point	Total Time (minutes)
ESP Outlet A	10	5	50	2	100
ESP Outlet B	10	5	50	2	100
Stack	4	7	28	3	84

3.1.1 ESP Outlet (A and B)

The ESP outlet duct "A" is identical to duct "B". Figure 2 illustrates a side view of the ESP outlet. Three straightening vanes turn the gases from a horizontal flow to a down flow direction past the test ports. The 10-foot long sample probe entered horizontally. Figure 3 illustrates a face view of the duct with 10 ports (4-inch pipe with caps) on each of the A and B sides. A straightening vane stops a few inches prior to the port elevation and three inches horizontally. Dust blowoff from the vane could cause sample contamination; however, we had no expedient method of evaluating the problem. Figure 2 also illustrates the distance to all five sample points. The building roof provided a convenient work access area for all ports.

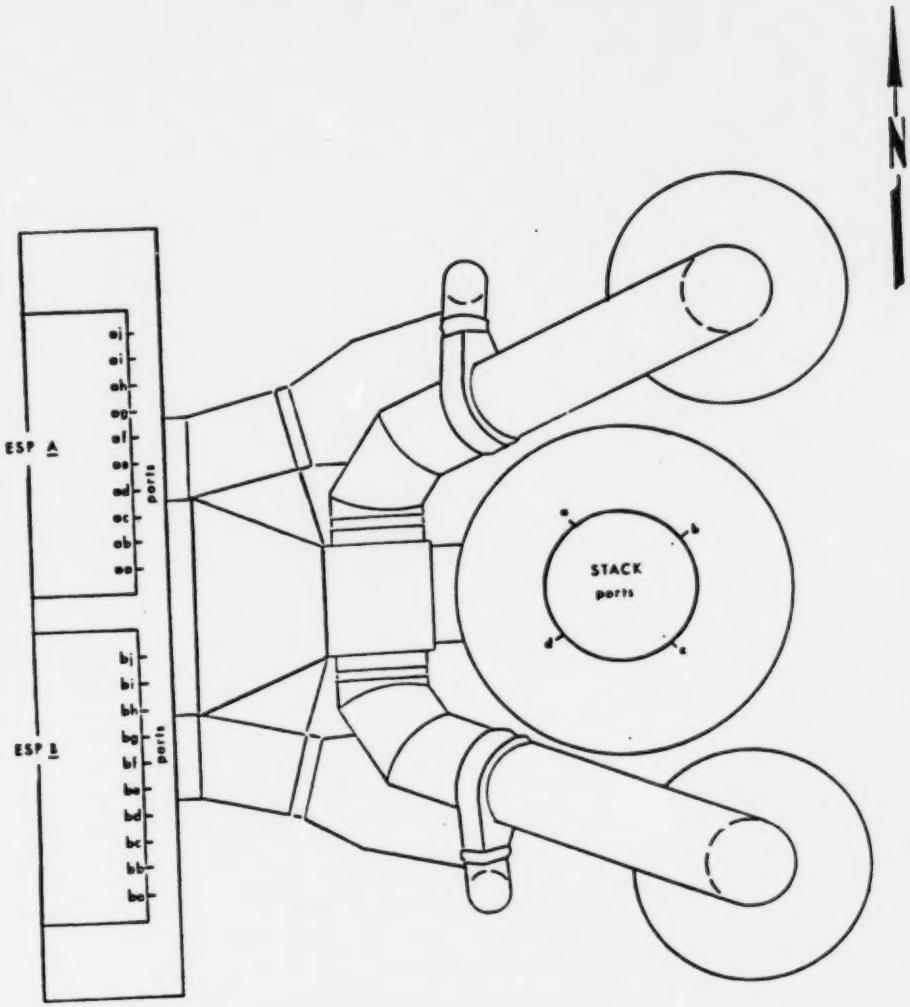


FIGURE 1

PLAN VIEW OF TEST LOCATIONS

3.1.2 Stack

Characteristics of the test location at the stack are presented in Figures 4 and 5. Figure 4 presents a side view and Figure 5 shows a cross-section. The port elevation is 715 feet and the breeching top is at approximately 493 feet. Considering a diameter of 19 feet, we thus have approximately 11-plus diameters to the test ports. EPA Method 1 would thus allow 12 total sample points based on an upstream disturbance (distance B in Method 1). The top of the stack is at elevation 962 feet (approximately), which provides significantly more than 2 diameters (distance A in Method 1); thus, 12 points would be acceptable. For improved accurancy we used 28 points or 7 each for the 4 ports.

Access to the sample platform was gained by climbing an offset ladder approximately 250 feet. The actual sampling process was tedious since the openings in the concrete shell were just barely large enough to pass the test equipment. L G & E provided an elevator between the liner and shell to facilitate equipment handling.

3.2 Sampling and Analysis Methods

3.2.1 Particulate and SO_2 Sampling

A combination EPA Method 5-8 sample train was used to measure particulates and SO_2 simultaneously (Federal Register, August 18, 1977). The particulate sample was isokinetically obtained per Method 5. The standard method 5 condenser setup was modified and a method 8 impinger train substituted, including a filter between the first and second impinger. The H_2O_2 concentration was varied in the second and third impingers depending on expected SO_2 concentration. 100 ml of 3% H_2O_2 concentration was used at the stack and 100 ml of 12% H_2O_2 was used at the ESP-A and B. Approximately 200 grams of silica gel was used in the last (4th) impinger. After the solutions were measured by graduated cylinder and poured into the impingers the solution plus impinger was weighed to the nearest 0.1 gram using an Ohaus 310 double beam balance.

The sampling trains used were Lear-Siegler, Inc. Model PM/100 Manual Stack Samplers (see Figure 6). The sampling trains consisted of a buttonhook-type nozzle, the appropriate probe, a two-section sample box, a 50' or 75' umbilical cord, and a control console. The control console contained a leak-free diaphragm pump, a dry gas meter, coarse and fine adjust valves, an inclined manometer, two thermometers, a pyrometer, a vacuum gauge, and umbilical cord connections. The diaphragm pump moved the stack gases through the sampling system while the dry gas meter measured the volume of gas sampled. Gas flow through the system was controlled with the coarse and fine adjust valves. The range of the dual inclined manometer was 0-5 in. H_2O graduated in 0.01 in. H_2O divisions from 0-1" and 0.1 in. H_2O from 1"-5". The manometer provided for simultaneous measurement of the pressure drop across the orifice in the control console and the differential pressure of the stack gas velocity at the sampling point(s). The umbilical cord and connectors united the metering/control console with the sample box. One portion of the sample box held a heating element which maintained the temperature around the filter holder at approximately 250°F. The other side of

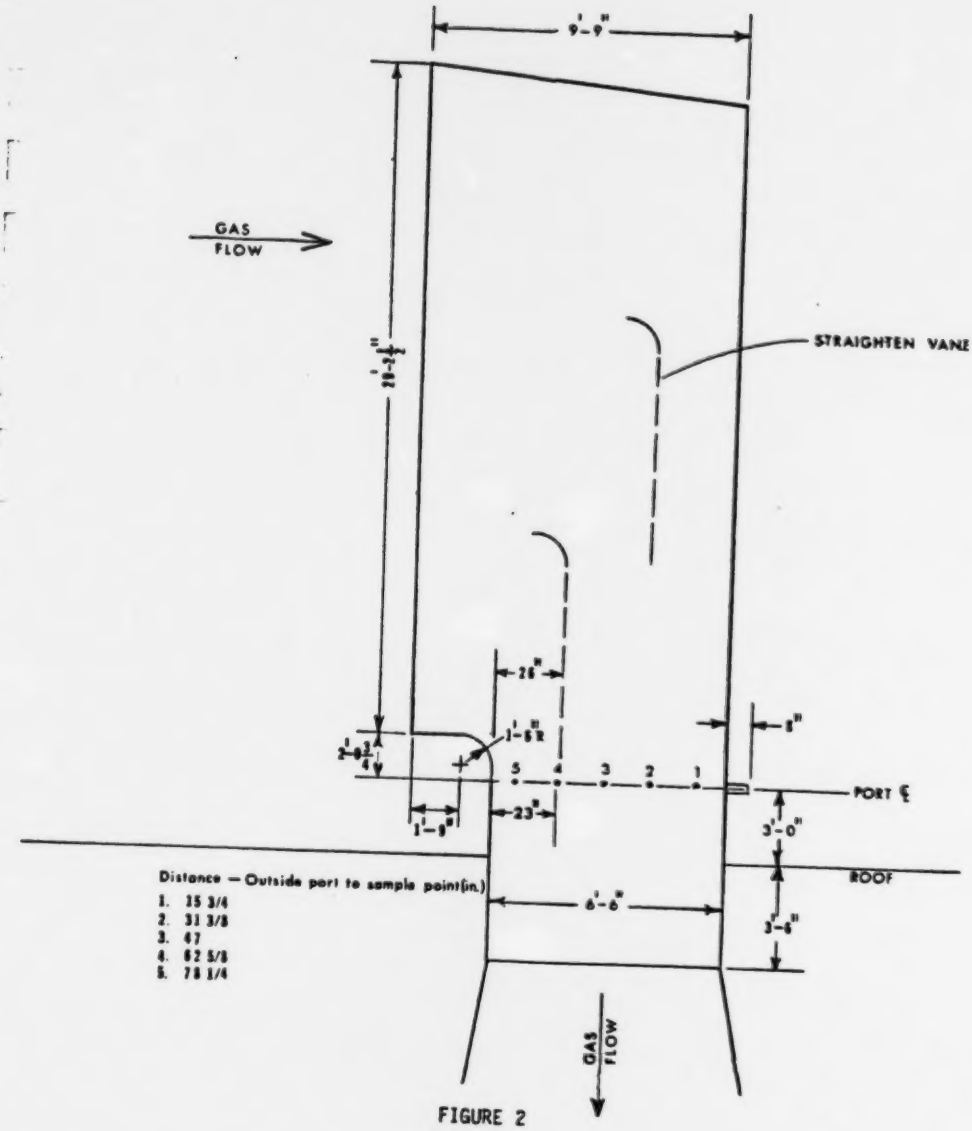
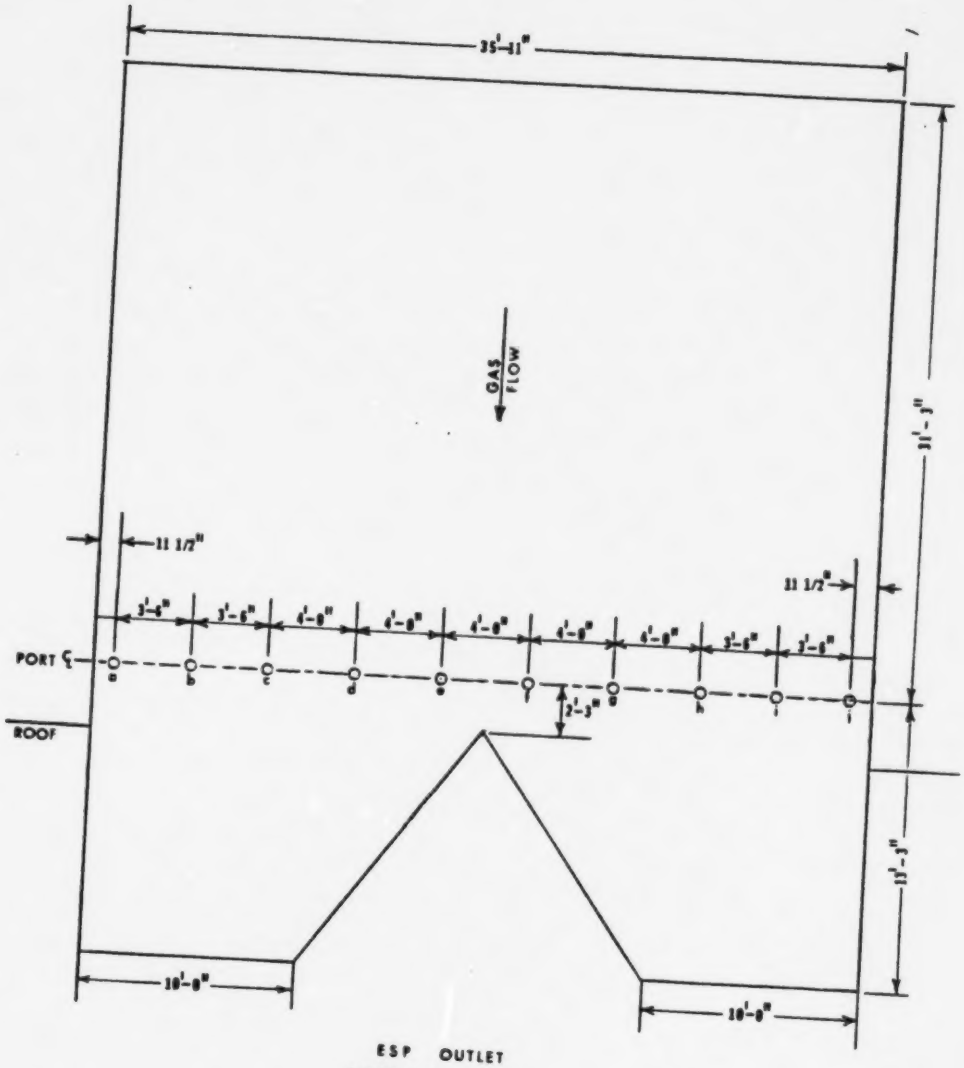


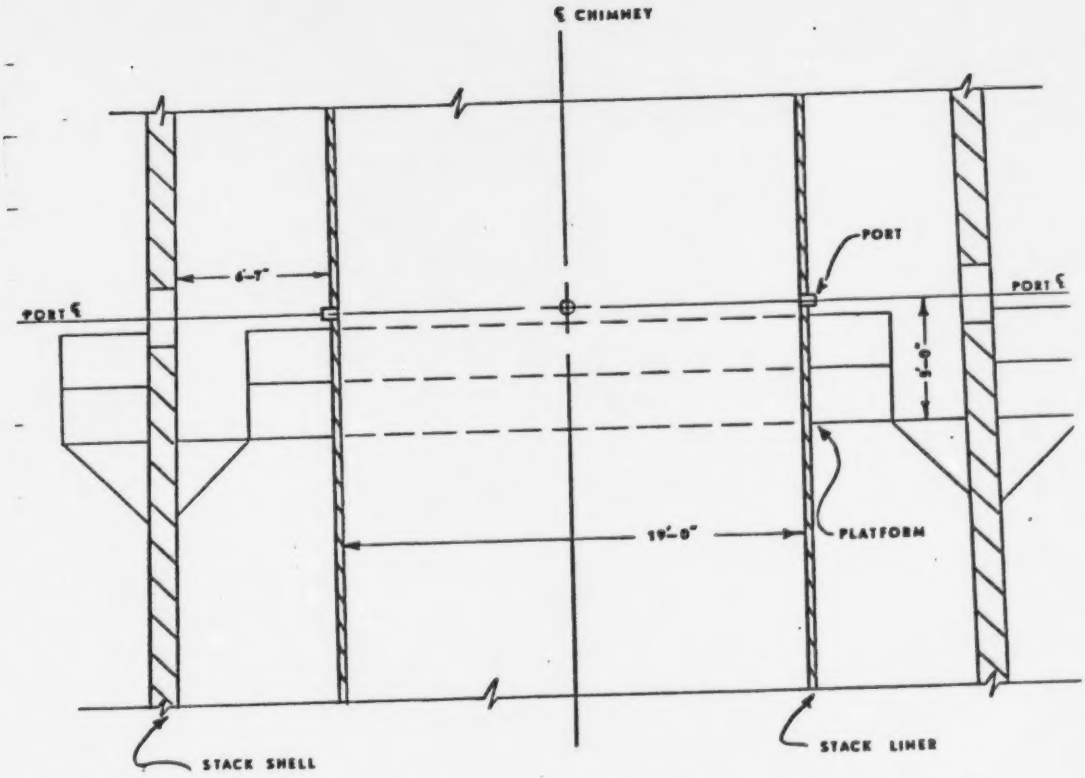
FIGURE 2

ESP OUTLET
(CROSS SECTION)



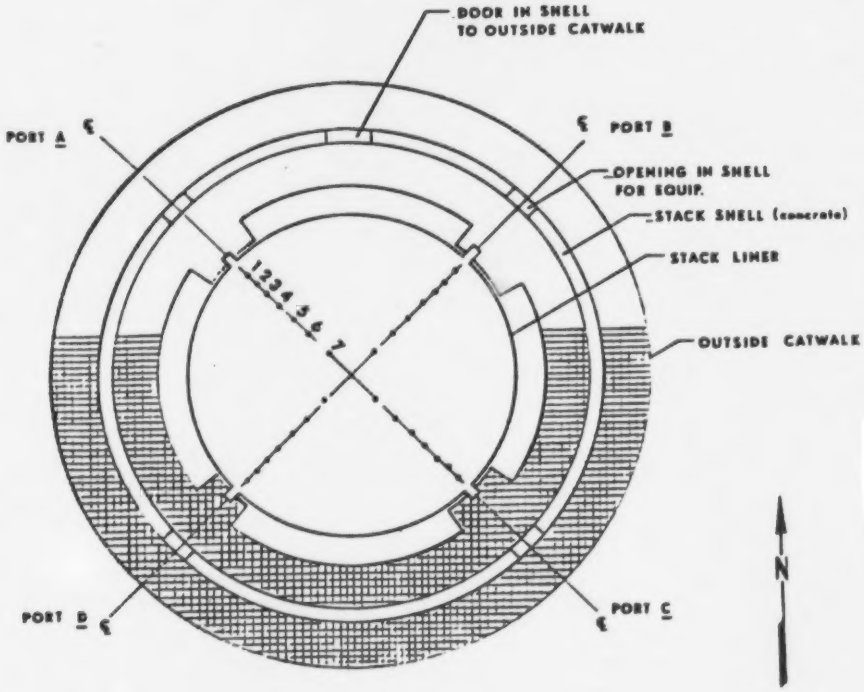
ESP OUTLET
(DUCT A & B SAME)

FIGURE 3



PORT ELEV. 715'
PORT LENGTH – 10"
6"Ø PORT W / CAP
STACK BASE ELEV – 461'
TOP OF STACK ELEV – 962'

FIGURE 4
STACK
SIDE VIEW – SECTION



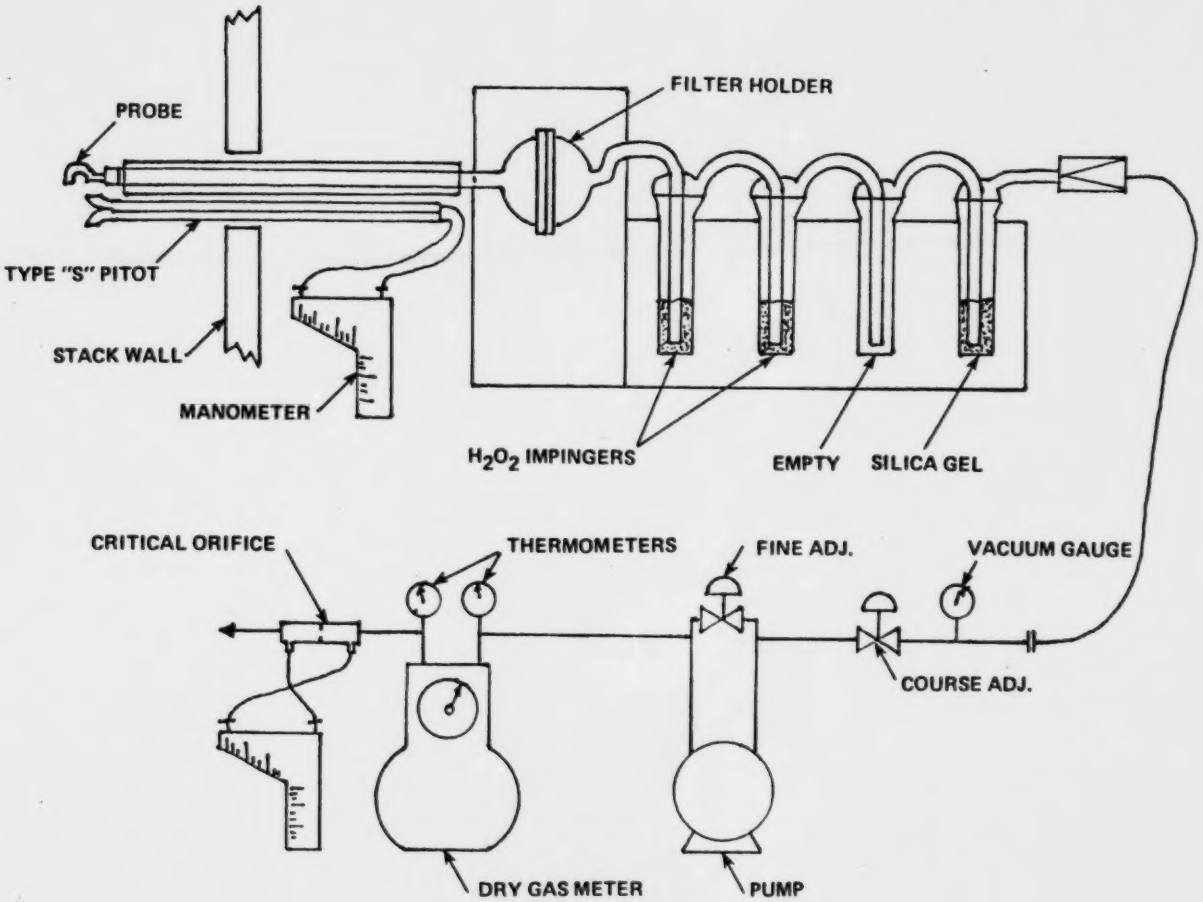
CATWALK INSIDE – OUTSIDE SHELL
19'–0" I.D. LINER AT PORT ELEV.
TOP OF BREECHING ELEV. 493'

PORT ELEV.–715'
PORT LENGTH – 10"
6 @ PORT W / CAP

DISTANCE FROM OUTSIDE PORT TO POINT (IN.)			
1. 14 1/8	3. 32 5/16	5. 55 13/16	7. 93 7/16
2. 23	4. 43 5/16	6. 71 5/16	

FIGURE 5
STACK
CROSS – SECTION

FIGURE 6


PROBE
TYPE "S" PITOT
STACK WALL
MANOMETER
FILTER HOLDER
H_2O_2 IMPINGERS
EMPTY
SILICA GEL
CRITICAL ORIFICE
THERMOMETERS
FINE ADJ.
VACUUM GAUGE
COURSE ADJ.
DRY GAS METER
PUMP

the sample box contained an ice bath with four glass impingers connected in series by glass u-tubes. The first impinger contained 100 ml. of 80% isopropanol. The second and third impingers contained 100 ml. of 3% or 12% hydrogen peroxide for the stack and ESP, respectively. The final impinger contained approximately 200 gm. of indicating silica gel. The ice bath-impinger combination collected the SO_2 and cooled and dried the flue gases sampled to prevent damage to either the pump or dry gas meter. It also allowed a determination of the stack gas moisture content for each run.

Heated stainless steel (Lear-Siegler) liner probes were used at all locations. The probes were horizontal for sampling at all locations. A 10-foot probe was used at the ESP outlets and an 8-foot probe was used at the stack. Type K thermocouples attached to the probes were used to measure temperature. A close visual inspection of the sample tips and "s" pitots was made after each run. Stack-duct pressure was measured using a stainless steel tube attached to a water column u-tube manometer. Random ports were sampled.

A Taylor aneroid barometer, (I.D. No. 102 - calibrated against a mercury column barometer) located in the Kenvirons laboratory trailer, was used each day to determine barometric pressure. The difference in elevation between the lab and each test location was determined and a correction made based on 0.11 inch mercury less pressure per 100 feet elevation.

Reeve Angel (900 AF) fiberglass filters were used for particulate collection. The glass filter holders were maintained at 248° ± 25°F. The filters had been tared and stored in new plastic petri dishes with tops pursuant to method 5 (see Appendix B for filter log).

As required, the pitot systems and the sampling trains were leak-checked before and after each test run. In all instances, the vacuum on the pitot system remained stable for at least fifteen seconds at 3" H_2O (or more) and the sampling train leaked less than 0.02 CFM at a vacuum of 15" Hg in pretest check and at the maximum sample vacuum during post-test check. Leak checks were made through the probe tip.

Moisture content, temperatures, and flowrates from previous test data were used to set sample conditions for Run 1. Subsequent runs were based on acquired data.

As a part of our quality assurance program and pursuant to method specifications the following equipment items were calibrated prior to and after testing:

1. console dry gas meter
2. console meter inlet/outlet thermometers or thermocouples
3. console timer
4. in stack-duct thermocouple

5. sample box hot side bimetallic thermometer
6. sample box cold side bimetallic thermometer
7. tip inside dimensions
8. "s" pitot for dimensions

We participated in the EPA interlaboratory QA program during November, 1979, wherein all three console dry gas meters were compared with a standard calibrated orifice provided by EPA. As noted in Appendix F, the units were off by -1.73% (D-328), -0.43% (D-467) and -0.83% (D-494), which is well within the mean value of all participants (-2.1%). All calibration data are presented in Appendix F.

We also participated in another EPA interlaboratory QA program during August, 1980 wherein all three console dry gas meters were compared with a standard calibrated orifice provided by EPA. As noted in Appendix F, the units were off by 0.2% (D-328), -0.03% (D-467) and 0.4% (D-494), which is well within the mean value of all participants (-2.1%).

All equipment was prepared and set up each day and process conditions monitored until all systems were "go". After receiving the Bechtel - EPA - L G & E "go" for a test, all three teams would start sampling. Table 5 presents a summary of sample times, teams, port-point information, and sample code data. As may be noted, the sample period was more or less simultaneous. If one team encountered shutdowns the other teams also shutdown and waited to resume sampling.

After the sample was collected, the trains were purged for 15 minutes per Method 8. Final leak checks were then performed and then the probes and sample boxes were transported to the lab for sample recovery.

3.2.2 Sample Recovery and Analysis

3.2.2.1 Particulates

Kenvirons, Inc. field laboratory (36-foot long trailer) was used for all sample recovery operations. A quasi-clean area was maintained for glassware cleanup and probe rinsing. A 12-18-foot-long (6-foot sections) stainless steel rod with a nylon brush attached was used to clean the probes. Per the method, six penetration cycles were used while spraying reagent grade acetone from a glass Guth wash bottle. The rinse sample from the probe was captured in a glass funnel into a glass sample container with a teflon cap liner.

A small nylon brush was used to remove the sample and clean the sample tip and glass tube up to the filter using rinse acetone. The particulate rinse sample was recovered using the "standard" (Method 5) acetone rinse. Blanks of acetone, 80% IPA, 12% H_2O_2, and 3% H_2O_2 were taken for each run. All blanks and samples were given a special laboratory number, as noted in Table 5. Filters also had a second Kenvirons number.

TABLE 5

COORDINATION CODE

Data	7-17-80			7-18-80			7-19-80			7-20-80			7-21-80		
Barometric Pressure	29.84 @ 7:10 AM			29.80 @ 7:35 AM			29.86 @ 8:00 AM			29.85 @ 7:44 AM			29.86 @ 8:05 AM		
Acceptance "Day" No.	1			2			3			4			5		
RUN NO.	STK-1	ESP-A-1	ESP-B-1	STK-2	ESP-A-2	ESP-B-2	STK-3	ESP-A-3	ESP-B-3	STK-4	ESP-A-4	ESP-B-4	STK-5	ESP-A-5	ESP-B-5
1. GENERAL INFORMATION															
Team	GR-PM	VAL-JB	RST-PR	GR-PM	VAL-JB	RST-PR	GR-PM	VAL-JB	RST-DB	GR-PM	VAL-JB	RST-DB	GR-PM	VAL-JB	RST-PR
Corrected Baro. Pressure	29.44	29.61	29.61	29.58	29.75	29.75	29.64	29.81	29.81	29.63	29.80	29.80	29.66	29.83	29.83
Official Start Time	14:15 PM	14:30 PM	14:30 PM	11:00 AM	11:00 AM	11:00 AM	10:30 AM	10:30 AM	10:30 AM	12:30 PM	12:30 PM	12:30 PM	10:30 AM	10:30 AM	10:30 AM
(Sample	14:22	14:28	14:28	11:07	11:00	11:15	10:40	10:36	10:35	12:35	12:30	12:30	10:30	10:30	10:30
Period)	17:02	17:26	16:55	13:01	13:40	13:44	12:01	13:04	13:07	14:24	14.56	14:48	12:19	12:45	12:33
2. SAMPLE POINT-TIME DATA															
No. Ports	4	10	10	4	10	10	4	10	10	4	10	10	4	10	10
No. Points Per Port	7	5	5	7	5	5	7	5	5	7	5	5	7	5	5
Total Points	28	50	50	28	50	50	28	50	50	28	50	50	28	50	50
Minutes Per Point (Min.)	3	2	2	3	2	2	3	2	2	3	2	2	3	2	2
Total Sample Time (Min.)	84	100	100	84	100	100	84	100	100	84	100	100	84	100	100
3. SAMPLE DATA-LAB. CODE															
Probe Rinse	3025	3024	3025	3037	3042	3038	3050	3051	3047	3069	3065	3071	3086	3086	3074
Acetone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H_2O and Acetone	3028	3026	3027	3039	3040	3029	3052	3044	3045	3060	3064	3072	3077	3085	3072
Filter-Lab. No.	79146	79149	79148	79151	79152	79150	79153	79156	79154	79158	79159	79167	79160	79168	79169
-Kenvirons No.	518.2	521.9	535.9	519.4	527.7	538.3	521.9	525.5	537.2	520.7	522.5	539.3	521.7	522.8	537.3
Imp. No. 1 Prel. Weight (GM)	531.5	522.0	539.5	526.0	532.9	550.4	526.6	538.3	540.5	568.0	543.1	543.0	568.5	542.9	554.7
(IPA) Final Weight (GM)	13.3	0.1	3.6	36.6	10.2	12.1	44.7	12.8	3.3	47.3	20.6	3.7	46.8	20.1	17.4
Net Weight (GM)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Container No. (IPA)	540.9	554.3	521.2	540.5	556.4	521.7	541.6	552.1	522.9	540.1	556.1	522.2	539.5	554.6	520.1
Imp. No. 2 Prel. Weight (GM)	562.1	602.6	563.5	599.2	602.0	563.8	583.5	596.8	564.3	579.1	599.5	567.0	579.7	600.8	564.6
(H_2O_2) Final Weight (GM)	21.2	48.3	42.3	49.7	45.6	42.1	41.9	44.7	41.4	39.3	43.4	44.8	40.2	46.2	44.5
Net Weight (GM)	529.6	572.5	538.9	524.9	571.0	537.1	524.7	571.7	537.1	524.1	571.6	537.8	522.7	571.6	538.3
Imp. No. 3 Prel. Weight (GM)	534.6	590.8	559.5	547.3	588.1	556.5	538.1	592.0	560.6	539.5	587.3	538.1	537.8	590.1	556.1
(H_2O_2) Final Weight (GM)	5.0	16.3	20.6	22.4	17.1	19.4	13.4	20.3	23.5	15.4	15.7	0.3	15.1	18.5	17.8
Net Weight (GM)	3015	3016	3017	3032	3034	3035	3053	3048	3046	3070	3063	3062	3080	3081	3076
Container No. (H_2O_2)	714.1	677.2	695.7	690.0	620.3	686.8	703.8	627.7	689.9	699.5	669.1	679.6	696.4	658.8	642.4
Imp. No. 4 Prel. Weight (GM)	742.7	693.6	718.7	720.4	647.0	707.1	716.8	647.8	716.6	713.2	685.4	692.3	709.4	676.5	660.0
(SiO_2) Final Weight (GM)	28.6	16.4	23.0	22.8	18.7	20.3	13	20.1	26.7	13.7	16.3	12.7	13.0	17.7	17.6
Net Weight (GM)	68.1	81.1	89.5	131.5	91.6	93.9	113.0	97.9	94.9	115.7	96.0	68.5	115.1	102.5	97.3
Total Moisture (ML/GM)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IPA Blank Cont. No. (BOX)	-	3018	3018	-	3036	3036	-	3055	3055	-	3066	3066	-	3083	3083
12% H_2O_2 Blank Cont. No.	3019	-	-	3033	-	-	3054	-	-	3067	-	-	3082	-	-
3% H_2O_2 Blank Cont. No.															
4. DRAEGER - SO_2 (ppm)	20			155			175			175			100		
5. PRELIMINARY FIELD SO_2 (ppm)	144	2980	2713	189	2378	2474	179	2516	2636	185	2714	2723	158	2590	2477
Acetone Blank Container No.	3020	2021	3022	3043	3041	3031	3057	3050	3049	3068	3061	3073	3084	3082	3075
H_2O_2 Concentration (%)	3	12	12	3	12	12	3	12	12	3	12	12	3	12	12
6. EQUIPMENT INFORMATION															
Console (DGM) No.	D-328	D-494	D-467	D-328	D-494	D-467	D-328	D-494	D-467	D-328	D-494	D-467	D-328	D-494	D-467
Average ΔH (in. H_2O)	0.532	0.580	0.706	0.577	0.640	0.647	0.487	0.852	0.790	0.478	0.621	0.634	0.462	0.648	0.613
DGM Factor "Y" Used	1.0170	1.0240	1.0370	1.0178	1.0250	1.0360	1.0158	1.0750	1.0390	1.0155	1.0248	1.0355	1.0155	1.0250	1.0350

TABLE 5

COORDINATION CODE (CONTINUED)

	7-22-80			7-23-80			7-24-80			7-25-80			7-26-80		
Date	29.79 @ 8:00 AM			29.80 @ 7:41 AM			29.62 @ 7:55 AM			29.84 @ 7:45 AM			29.70 @ 7:40 AM		
Barometric Pressure	(6)			(7)			(8)			(9)			(10)		
Acceptance "Day" No.	STK-6	ESP-A-6	ESP-B-6	STK-7	ESP-A-7	ESP-B-7	STK-8	ESP-A-8	ESP-B-8	STK-9	ESP-A-9	ESP-B-9	STK-10	ESP-A-10	ESP-B-10
RUN NO.															
1. GENERAL INFORMATION															
Team	GR-PM	VAL-JB	RST-PR	GR-PM	VAL-JB	RST-PR	GR-PM	VAL-JB	RST-PR	GR-PM	VAL-JB	RST-PR	GR-PM	VAL-JB	RST-PR
Corrected Baro. Pressure	29.57	29.74	29.74	29.58	29.75	29.75	29.60	29.77	29.77	29.82	29.79	29.79	29.56	29.73	29.73
Official Start Time	10:45 AM	10:45 AM	10:45 AM	16:20 PM	16:20 PM	16:20 PM	11:00 AM	11:00 AM	11:00 AM	11:45 AM	11:45 AM	11:45 AM	09:30 AM	09:30 AM	09:30 AM
(Sample)	10:35	11:04	11:09	16:20	16:20	16:20	11:00	11:00	11:00	11:45	11:45	11:45	09:35	09:30	09:30
Period	12:16	13:12	14:16	18:14	18:34	18:23	12:44	13:12	13:02	13:21	13:46	13:50	11:16	11:40	11:29
2. SAMPLE POINT-TIME DATA															
No. Ports	4	10	10	4	10	10	4	10	10	4	10	10	4	10	10
No. Points Per Port	7	5	5	7	5	5	7	5	5	7	5	5	7	5	5
Total Points	28	50	50	28	50	50	28	50	50	28	50	50	28	50	50
Minutes Per Point (Min.)	3	2	2	3	2	2	3	2	2	3	2	2	3	2	2
Total Sample Time (Min.)	84	100	100	84	100	100	84	100	100	84	100	100	84	100	100
3. SAMPLE DATA-LAB. CODE															
Probe Rinse	3101	3096	3098	3115	3110	3103	3125	3120	3118	3138	3143	3137	3150	3149	3144
Acetone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H_2O and Acetone	3079	3090	3078	3107	3108	3092	3123	3119	3105	3130	3134	3117	3151	3150	3142
Filter-Lab. No.	79171	79172	79170	79173	79174	79175	79177	79178	79176	80041	80040	79179	80042	80043	80044
-Kenvirons No.	518.7	523.1	538.5	5195	522.7	536.7	520.8	524.5	540.5	518.9	523.3	538.2	518.2	524.2	536.1
Imp. No. 1 Prel. Weight (GM)	559.5	543.2	556.9	549.1	543.7	535.1	559.2	551.9	560.4	554.8	540.2	546.7	530.9	537.0	543.5
(IPA) Final Weight (GM)	40.8	20.1	18.4	29.6	20.4	-1.8	38.4	27.4	19.90	35.9	16.9	8.8	12.7	12.8	7.4
Net Weight (GM)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Container No. (IPA)	539.7	551.3	521.8	539.6	552.1	517.5	541.7	552.7	521.0	540.8	553.1	518.9	536.9	553.4	518.9
Imp. No. 2 Prel. Weight (GM)	584.8	600.6	564.8	579.2	592.2	563.6	587.1	597.6	564.3	586.8	599.5	562.1	587.8	587.3	563.1
(H_2O_2) Final Weight (GM)	45.1	49.3	43.0	39.6	40.2	46.1	45.4	44.9	43.3	46.0	46.4	43.2	50.9	43.9	44.2
Net Weight (GM)	526.8	572.3	540.3	522.3	569.9	534.8	524.6	571.1	537.9	522.6	567.9	538.0	526.5	570.5	538.1
Container No. (H_2O_2)	540.5	580.6	559.0	535.7	585.2	554.9	537.9	588.7	555.5	537.7	584.3	556.3	548.1	589.1	555.9
Imp. No. 4 Prel. Weight (GM)	13.7	18.3	18.7	13.4	15.3	20.1	13.3	17.6	17.6	15.1	16.4	18.3	21.6	18.6	17.8
(SiO_2) Final Weight (GM)	3093	3089	3091	3111	3106	3104	3120	3121	3116	3135	3131	3133	3155	3148	3146
Net Weight (GM)	695.4	656.9	664.9	678.9	667.4	665.8	692.6	654.3	669.6	687.2	650.3	679.6	691.8	655.3	660.5
Total Moisture (ML/GM)	707.4	677.8	686.6	689.5	681.5	682.0	704.6	671.5	698.1	700.2	666.5	697.3	707.2	672.9	677.6
IPA Blank Cont. No. (80%)	12.1	29.5	21.7	10.6	14.1	16.4	12.0	17.6	18.5	13.0	16.2	17.7	15.4	17.6	17.1
12% H_2O_2 Blank Cont. No.	111.7	108.6	101.8	93.2	90.0	80.8	109.1	107.5	99.3	110.0	95.9	87.2	100.6	92.5	86.5
3% H_2O_2 Blank Cont. No.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. DRAEGER - SO_2 (ppm)	-	3095	3095	-	3113	3113	-	3128	3128	-	3141	3141	-	3152	3152
5. PRELIMINARY FIELD SO_2(ppm)	3094	-	-	3112	-	-	3127	-	-	3140	-	-	3153	-	-
Acetone Blank Container No.	200			155			135			145			140		
H_2O_2 Concentration (%)	285	2817	2890	158	2386	2319	161	2431	2398	131	2520	2368	134	2404	2277
6. EQUIPMENT INFORMATION	3100	3097	3099	3114	3109	3102	3126	3120	3122	3139	3132	3136	3154	3147	3145
Console (DGM) No.	3	12	12	3	12	12	3	12	12	3	12	12	3	12	12
Average ΔH (in. H_2O)	D-328	D-494	D-467	D-328	D-494	D-467	D-328	D-494	D-467	D-328	D-494	D-467	D-328	D-494	D-467
DGM Factor "Y" Used	0.440	0.607	0.613	0.364	0.535	0.450	0.397	0.607	0.563	0.437	0.590	0.542	0.398	0.561	0.550
	1.0145	1.0245	1.0350	1.0115	1.0230	1.0320	1.0130	1.0245	1.0340	1.0135	1.0240	1.0330	1.0130	1.0235	1.0340

The volume of condensate, etc., in each impinger after the run, was determined by weighing the impinger plus contents to the nearest 0.1 gram. Since we had the tare weight, the difference in weight was assumed to be moisture condensate from which the stack-duct moisture content was determined.

The 4-inch fiberglass filter was carefully removed from the glass holder and placed into the original petri container (plastic). Laboratory tweezers were used to scrape the silicone rubber gasket to remove all traces of the filter. High SO_2 concentrations at the stack and ESP caused deterioration in the red-color 4-inch silicone gasket which was carefully prevented from being added to the sample filter container. It was also noticed that a red-color film had collected on the first impinger insert and it was very hard to remove. This film was thought to be coming from the red silicone gasket. This red film was noticed during sample recovery through out the ten-day test period. New silicone gaskets were used for each run. The acetone rinse and blank samples plus the filters were returned to the Kenvirons laboratory in Frankfort for analysis.

Upon return to the Frankfort laboratory the filters were desiccated and weighed to constant weight as noted in Appendix B. The acetone samples and blanks were measured volumetrically then evaporated in tared beakers (glass) desiccated and weighed per method 5 procedures. The weight gain by each filter was added to the corresponding acetone rinse weight (less blank correction) and reported as total particulate weight for that test (Appendix B).

Due to a malfunctioning valve in one of the laboratory desiccators, the acetone evaporations from Day 2 may have been cross-contaminated, and some particulate lost in the desiccator. The ESP-B-2 acetone rinse beaker was closest to the valve. Beakers ESP-A-2 acetone rinse and ESP-B-2 acetone blank were the only 2 beakers immediately adjacent to ESP-B-2 beaker. They received some loose dust from the ESP-B-2 spill. This loose dust, however, was deposited on top of firmly caked particulate matter in ESP-A-2 acetone rinse beaker and could be removed simply by pouring the loose dust back into ESP-B-2 acetone rinse beaker; loose dust also fell into ESP-B-2 acetone blank (empty) and was returned to ESP-B-2 acetone rinse in the same manner. The remainder of the loose dust was deposited within the desiccator itself and was returned to ESP-B-2 acetone rinse beaker using a camel hair brush and tweezers, although some particulate loss did occur.

3.2.2.2 <u>SO_2</u>

The SO_2 sample recovery operation consisted of first checking all impingers and the in-line filter for signs of transfer or backflush of either the IPA or H_2O_2. Apparently high gas temperature and/or high duct vacuum caused one EPA evaporation (impinger No. 1 IPA loss of weight) for run ESP-B-7 as noted on Table 5.

Each impinger was weighed (Ohaus 710 triple beam balance) and the weight noted to determine moisture content. Next, the IPA was discarded and the contents of the second and third impingers were poured into a 1000 ml.

graduated cylinder. Afterwards, these two impingers and all connecting glassware tubes between them were rinsed twice with deionized distilled (D-D) water, and the washings added to the 1000 ml. cylinder. The SO_2 sample recovery was completed by diluting the contents of the cylinder to exactly 1000 ml. with D-D water. The sample was then sealed in a sample container (glass, teflon liner cap).

A preliminary sample analysis (field titration) was performed on all samples for SO_2. These values were compared with Draeger tube grab samples also taken during the runs to establish approximate sampling representation accuracy (see Table 5).

Final sample analysis was performed at the Frankfort laboratory by first checking for sample loss and then pipetting a 10 ml. aliquot from the 1000 ml. sample container into a 250 ml. or 500 ml. Erlenmeyer flask, then adding 40 ml. of 100% isopropanol and two to four drops of thorin indicator. This solution was titrated to a peach-pink end-point using a previously standardized 0.0100 N (±0.0002N) barium chloride. The titrations were repeated and each time the replicate titration agreed within one percent or 0.2 ml.

Standardization of the 0.0100 N(±0.0002N) barium chloride was performed at least once per day against 25 ml. of standardized sulfuric acid to which 100 ml. of 100% isopropanol had been added. For test runs one through eight, the sulfuric acid had been previously standardized in Kenvirons Frankfort laboratory using 0.0100N (±0.0002N) NaOH which had been standardized against a potassium acid phthalate primary standard.

Due to the primary purpose of the scrubber demonstration program being SO_2 control technology, an emphasis was placed on accuracy in SO_2 measurements at all locations. Several cross-check measurements were thus made at several locations. L G & E operated a continuous Lear Siegler (LSI) SO_2 monitor at the stack location and Dupont instruments prior to and downstream from the scrubber. After the first few days of testing, stack SO_2 values did not agree well enough. L G & E had the LSI recalibrated against a 101 PPM SO_2 tank provided by Kenvirons. After recalibration, the Kenvirons values were still too high by 10-20% (see Table 5 preliminary day 1-8 versus Table 2).

At the end of the eighth day of the testing program it was discovered that the normality of the standard sulfuric acid used to determine the barium chloride normality had changed. Mold growth had apparently decreased the normality of the acid by fifteen percent. This would have effectively increased (thus our values were too high) the measurement of the stack and ESP sulfur dioxide concentration by fifteen percent. On day nine and ten a new commercially prepared (Fisher Scientific) solution of .02 ± .0002 normal sulfuric acid (lot #704099) was used to determine the normality of the barium chloride. This solution contained a mold inhibitor. The same standard sulfuric acid solution was used to determine the barium chloride normality for the final sample titrations performed in the lab and also for the Kenvirons, September, 1980, sulfur dioxide determinations of EPA interlaboratory quality assurance standard sample. The EPA interlaboratory quality assurance results for September, 1980, Performance Audit Program Method 6 (SO_2), are noted in Appendix F. Blanks were also run with each series of

samples by titrating a 10 ml. aliquot from both the 3% and 12% H_2O_2 solutions that were freshly prepared for that sampling day. The H_2O_2 blanks were titrated using the same procedure used for sample analysis.

The results of the sample and blank analysis are presented in Appendix C.

In addition to sulfuric acid standardization, the reagent grade isopropanol was checked for peroxide impurity in Kenvirons' Frankfort laboratory using the procedures given in EPA Method 8.

3.2.3 Carrier Gas Sampling and Analysis

An integrated EPA Method 3 gas sample was taken simultaneously (same probe) with the Method 5-8 sample at the stack for each run. Figures 7 and 8 illustrate the Method 3 sample train and the probe design. The sample was collected in a 100-liter Tedlar bag which was analyzed by Orsat in the field after each run. The bag was leak checked per Method 3. Several 100 ml. Orsat analyses were performed to obtain a repeatable value.

Carrier gas sampling at all locations also was performed using a Fyrite kit (CO_2 and O_2 only). Several samples were taken during each run from random ports and the results recorded. The average of all measurements was used for run calculations. A stainless steel tube was inserted into the duct several feet beyond the port wall to obtain the sample. The kit was purged pursuant to instructions (Ambac and Bacharach).

For data reduction, Orsat results were used for stack calculations and average Fyrite results were used for the ESP A and B calculations.

3.3 Daily Log Discussion

The following presentation identifies testing procedure problems, plan changes, and corrective action that should be considered in evaluating data and results. Activities during each onsite day are discussed.

7-14-80

* Rick Melloan and Dave Watson reported boiler problems and consequent testing delay of several days.

7-16-80

* Dave Watson reported boiler problems resolved, requested testing commence 7-17-80.
* Equipment set-up, final preparations, leak checks
* Stack elevator problem and inability to use bullet hoist for equipment transport noted.

7-17-80 (Run 1)

* Barrel hoist in stack made temporarily operable

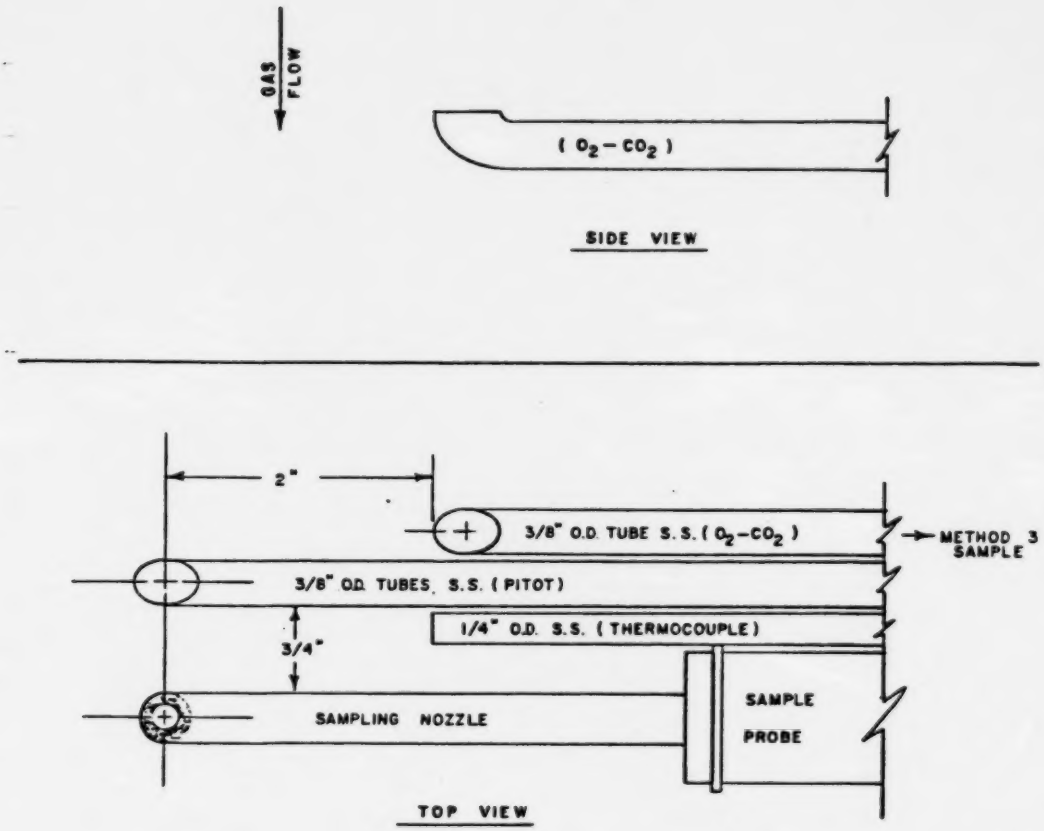


FIGURE 7

EPA METHOD 3 PROBE ATTACHED TO METHOD 5 PROBE

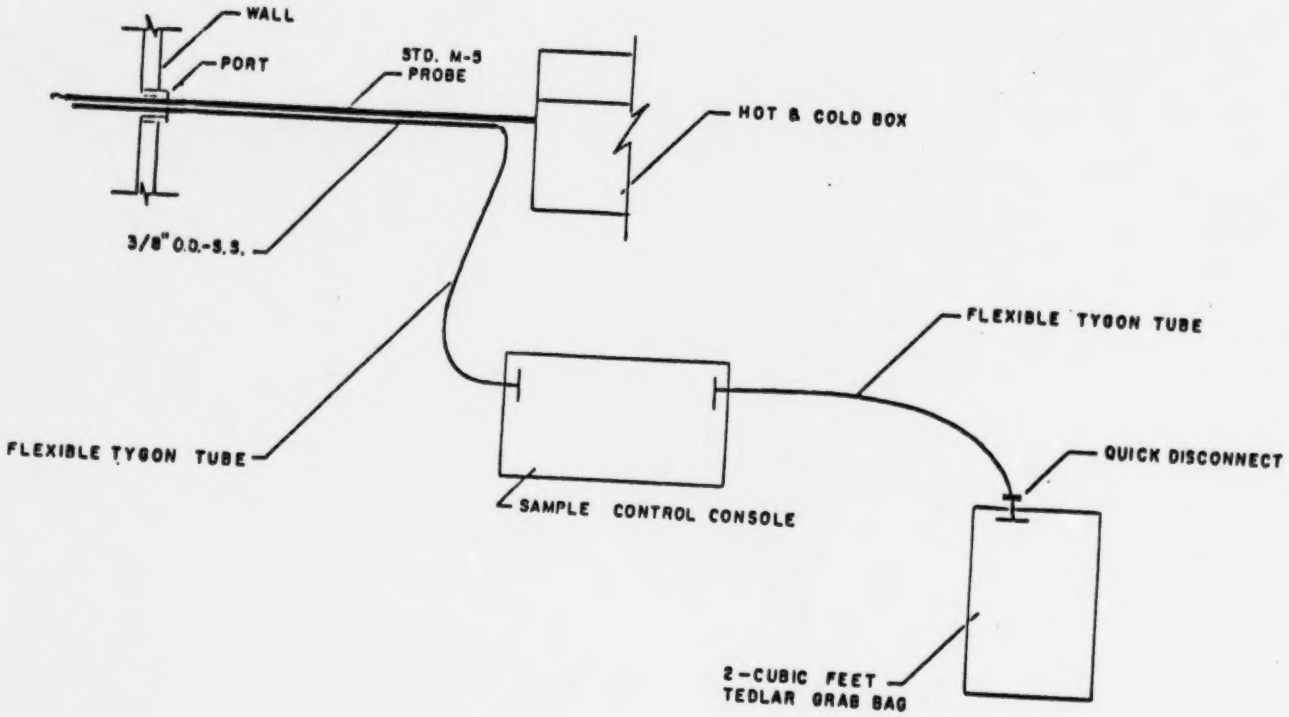


FIGURE 8

INTEGRATED GAS SAMPLING TRAIN
METHOD-3

* IPA backup in impingers on one of the ESP sampling units (due to ambient heat) wet a hot filter, necessitating filter change and reweighing.
* 8-ft. probe at stack had short in heater and a crossthreaded union - repaired by 12:30 p.m.
* 12:30 p.m. coordination meeting. Testing to start at 2 p.m. Scrubber reported tuned and operating.
* 2:00 p.m. - Probe tip at stack replaced with smaller tip due to higher flow rates.
* Stack team commences sampling at 2:15 p.m.; ESP starts at 2:30 p.m.
* 3:00 p.m. - Load at 240 MW; LSI monitor reads 70-80 ppm SO_2 at stack, 2400 ppm SO_2 at ESP outlet.
* Testing finished at 5:45 p.m.; cleanup commenced.
* 6:20 p.m. - Dave Watson requests no sulfate cleanup by Kenvirons
* Completed cleanup at 8:20 p.m.; titrations begun before leaving.

7-18-80 (Run 2)

* Told at 10:00 a.m. to begin testing when we are ready
* Leak check problems at stack corrected by 10:30 a.m.
* Testing began at 11:00 a.m.
* 11:25 a.m. - Stack SO_2 at 70 ppm; ESP Outlet SO_2 at 2200 ppm.
* 1:40 p.m. - Stack SO_2 unchanged; ESP Outlet has risen to 2300 ppm SO_2.
* Testing completed by 2:30 p.m.; sample recovery and preliminary titrations completed by 7:00 p.m.

7-19-80 (Run 3)

* 15% moisture at stack during Run 2 reported; were informed by Bud Carter that ESP-B reheat had tripped off 2 or 3 times.
* Testing began at 10:33 a.m. after leak check problems at ESP-A had been corrected.
* Stack temperature fluctuating between 140° - 190°F at noon, per Kenvirons instruments (control room reports LSI readings of 150 - 151°F).
* ESP-B reported to have lost reheat from 11:50 - 11:54 a.m.
* Testing completed by 2:00 p.m.
* Red color on wet filter noted during cleanup

7-20-80 (Run 4)

* Unit 5 scrubber washing at 10:00 a.m. causes high ambient SO_2 at ESP, delaying test startup.
* Both the LSI monitor and Kenvirons' Draeger tubes check within 25 ppm on 2 tanks having 300 ppm and 600 ppm SO_2; yet, LSI still reads 70-90 ppm SO_2 in stack while Draeger tubes read 150 - 200 ppm. Dave Watson reports 15% stack moisture is reasonable.

* Control room reports at 12:25 p.m. 100 ppm SO_2, 150°F, and 6.8% O_2 at stack; at ESP outlet, SO_2 between 2400 - 2600 ppm.
* Testing commenced at 12:30 p.m.
* Testing completed by 3:00 p.m. ESP obtained only one good Fyrite measurement at each side before last of chemicals expired.

7-21-80 (Day 5)

* Began testing at 10:30 a.m.
* Control room at 10:35 a.m. reported 80 ppm SO_2, 140°F, and 7.2% O_2 at stack, 2400 - 2500 ppm SO_2 at ESP outlets.
* Fyrite chemicals for O_2 replenished via courier at 11:30 a.m.
* Testing completed by 2:00 p.m.
* Dave Watson reiterated problem with discrepancies in stack SO_2 values, mentioned possibility of engaging a third party to perform M6 samples.
* Pink filters again reported, particularly at ESP; suggested explanation is breakdown of silicone gasket on hot box by heat and SO_2.

7-22-80 (Day 6)

* Equipment setup at stack delayed until 10:30 a.m. by elevator repairs.
* ESP-B reheat reported off at 9:30 a.m.
* Testing OK'd at 10:30 a.m., commenced at 10:45 a.m.
* Mostardi-Platt team arrived to double-check stack SO_2 readings by M6.
* ESP-B reheat revised and coming back up; hence, expect less stack stratification.
* ESP-B reading erratic ΔP at noon; reported condensate in pitot lines and tried to correct problem by blowing out lines, with only partial success.
* Control room at 12:40 pm.m. reported 130 - 150 ppm SO_2, 150°F, and 6.8% O_2 at stack; 2400 - 2500 ppm SO_2 at ESP outlets.
* Stack team at 12:45 p.m. reported 200 ppm SO_2 per Draeger tubes.
* Testing completed by 3:00 p.m.
* Dave Watson reported at 3:00 p.m. that L G & E's pH probe had malfunctioned, causing loss of full control, in turn possibly causing high SO_2.
* Dave Watson and Mostardi-Platt team reported M6 readings of stack SO_2 to be 160 - 190 ppm, whereas Kenvirons' Draeger tubes indicated 200 ppm and the LSI monitor only 90 ppm, thus supporting the Kenvirons stack data.

7-23-80 (Day 7)

* Dave Watson reported at 8:30 a.m. a problem reaching full load (now at 150 - 160 MW), requested use of Kenvirons' 100 ppm SO_2 tank for low-scale calibration of LSI Stack SO_2 monitor (tank delivered at 1:00 p.m. this day).

* Bud Carter at 9:15 a.m. reported wet coal was delaying attainment of full load.
* Mickey Martin at 12:10 p.m. reported load down to 200 MW.
* Control room reported 240 MW load at 2:15 p.m.
* Fire in L G & E Mill at 2:55 p.m. brought load down to 220 MW by 3:00 p.m.
* LSI technician acknowledges problems with its stack SO_2 monitor in the low range; N_2 injections show a 55 ppm reading should be 0 ppm.
* Mickey Martin reported at 3:30 p.m. that load was still 200 - 220 MW, that today would have to be scrubbed as an official Acceptance Test day, but that Kenvirons should to ahead and test anyway.
* Testing commenced at 4:20 p.m.; load at 225 MW.
* Control room at 6:10 p.m. reported 225 MW load, 7% O_2 at stack, and 2200 ppm SO_2 at ESP outlets.
* Sampling completed by 7:20 p.m.

7-24-80 (Day 8)

* Stack reported leak check problems at 10:10 a.m. caused by cracked brass fitting connecting cold sample box and umbilical; brass fitting replaced
* Began testing at 11:00 a.m.
* Control room at 11:05 a.m. reported 92 ppm SO_2 (per LSI), 150°F, and 6½% O_2 at Stack; 2100 ppm SO_2 at ESP outlets; load at 240 MW. Also reported that ESP-B reheat had been out all morning.
* Control room at 12:50 p.m. reported 91 ppm SO_2 (per LSI), 150°F, and 6½% O_2 at stack; 2100 ppm SO_2 at ESP outlets. ESP-B reheat still out.
* Testing completed by 1:45 p.m.
* Mostardi-Platt results from 3 samples averaged 120 ppm SO_2 wet, 140 ppm dry; Kenvirons dry SO_2 result was 150 ppm, moisture was 15%.

7-25-80 (Day 9)

* New standard solution prepared last night to replace spent original; comparison revealed 14% difference in accuracy explaining some of the earlier-mentioned high SO_2 values. Subsequent check against the new Fisher standard solutions revealed our original 0.0102 N standard solution to be in error by a factor of 0.85 (i.e., our standard for Runs 1-8 was 15% too high). On Days 9 and 10, we used the Fisher .02N standard.
* Elevator repairs at 9:15 p.m. were causing stack transport/testing delay.
* Dave Watson at 10:05 a.m. reported an hour's delay due to pH problems and high SO_2 (per LSI); offered us a supply of Bechtel's 0.02 N standard solution.
* Testing began at 11:45 a.m.
* Control room at 1:40 p.m. reported 95 ppm SO_2 (per LSI), 150°F, and 7% O_2 at stack; 2500 - 2700 ppm SO_2 at ESP outlets; load at 240 MW; and ESP-B reheat on but still low.
* Testing completed by 2:25 p.m.

7-26-80 (Day 10)

* Control room at 8:40 a.m. reported 158 ppm SO_2 (per LSI), 155°F, and 7½% O_2 at the stack; 2300 - 2500 ppm SO_2 at ESP outlet; load at 240 MW as of 8:38 a.m.; and ESP-B reheat in service but low. By 9:15 a.m., the SO_2 values had changed to 137-142 ppm at the stack and 2400 - 2600 ppm at ESP outlets.
* Testing began at 9:30 a.m.
* Dave Watson reported that cause of LSI's low SO_2 values was that the blowback system had been destroyed by lightning.
* Control room at 11:30 a.m. reported 135 ppm SO_2 at ESP outlets and ESP-B reheat out as of 10:53 a.m.
* Testing completed at noon; ESP Fyrite filter found to be leaking: problem corrected and Fyrites rerun.

4.0 DATA REDUCTION

A first phase of data reduction was performed in the field following each run. The phase involved determining percent isokinetic which required O_2 and CO_2 results plus moisture condensate volume in addition to sample parameter averages (stack-duct temperature, pitot ΔP, orifice ΔH and DGM in-out temperatures). Copies of calculations performed are presented in Appendix D. Equations used were taken from the Federal Register for Method 5/8, August 18, 1977.

The average orifice ΔH for each run was used to determine a DGM correction factor "γ" which is input to Equation 1, Appendix D. A multipoint calibration curve relating these two parameters was developed for each console meter prior to testing (see Appendix F). "γ" values are presented in Table 2.

After the final particulate filter weights and rinse capture mass were determined, the second and final phase of calculation was performed. Appendix B presents analytical particulate results that were input (mg) to Appendix D to finally calculate grain loading and lb/MMBTU, etc.

After the SO_2 analysis was complete, (Appendix C) sample volumes from Appendix D (VMSTD) were transferred to determine SO_2 in lb/DSCF, lb/MMBTU, lb/hr., and ppm, as indicated in Appendix E.

The final calculation checks were made by computer for both particulate and SO_2. Results are in Appendix F.

5.0 QUALITY ASSURANCE

The quality assurance (QA) task for this project was informal, yet consistent with program goals, priorities and budget constraints. We did not establish a formal program per se, such that third-party independent audits were performed or samples were split or spiked and sent to third party laboratories for analysis.

The QA effort primarily consisted of:

* A comprehensive equipment pre-and post-test calibration effort,
* Adhering to Method 5-8 requirements which have built-in checks,
* First calculations manually followed by double checking calculations by computer,
* Some confirmation measurements using less expensive, less accurate samplers such as a Draeger for SO_2, and
* Comparing all measurement results with expected values based on theory or previous tests. (Abbreviated on instruction from Bechtel.)

These QA elements are consistent with overall requirements for more formal efforts as stipulated in "Quality Assurance Handbook for Air Pollution Measurement Systems", Volume III, Stationary Source Specific Methods, August, 1977.

A comprehensive equipment calibration file was maintained (Appendix F) that included

(1) pre-and post-test for the Method 5-8 dry gas meter (DGM),

(2) sample tips (nozzles),

(3) thermometers,

(4) thermocouples,

(5) barometers,

(6) pitots, and

(7) interlaboratory participation.

The DGM is probably the most critical element; thus, we confirmed its accuracy through three independent means. We maintain a reference DGM that has been calibrated against a wet test meter and bell prover at the University of Kentucky Department of Mechanical Engineering. A 7-point (flow rate) pre-test calibration is performed on each Method 5 console and a curve established (see Appendix F). After a run is completed and the average orifice ΔH calculated, the DGM correction (Y) is determined (see Table 2).

Our second confirmation of the DGM accuracy consisted of participating in the EPA Interlaboratory QA study of November, 1979 (Appendix F), wherein an EPA-calibrated orifice was used on our consoles. The resulting flow rates were then compared. Our three console DGM's were well within the average accurancy (2.1%). Two of the meters averaged less than 1.0%.

The third confirmation consists of a follow-up participation in another EPA Interlaboratory QA study, September, 1980 (Appendix F). This study showed that our three console DGM's were well within the average accuracy of (-2.1%). In fact, the overall average of the three meters was 0.21%.

Appendix F also presents calibrations of nozzles (tips). Several inside diameter measurements were made and averaged per Method 5 using a micrometer. Tips were inspected during and after sampling to insure no damage. If they were damaged they were recalibrated in the field before using again.

Thermocouples and bimetallic thermometers were calibrated against mercury-in-glass thermometers in an oil bath.

We also participated in an EPA interlaboratory QA study that determined the laboratory's accuracy in SO_2 titration. Appendix F presents our most recent results (we used the same standard solution - Fisher - earlier discussed). As may be noted, all participating labs averaged 1.69 - 2.72% difference while our values ranged from -2.68% to 1.0%. Our values are thus comparatively accurate, however, slightly lower than other labs.

6.0 DISCUSSION

Table 2 presented a summary of test data and results, and Table 3 presented data averages and ranges. As discussed in Section 2.0, most measured values and results were within expected ranges. Problems encountered in field measurements, sample analysis, data reduction, etc., have been generally discussed in previous report sections. The daily log also clarified problems with specific runs for evaluation purposes.

Table 6 presents a listing of sample particulate results for each run. That portion of the sample captured on the filter versus probe rinse is illustrated. A consistent percentage capture on the filter indicates consistency in sampling and indirectly particle size. Run results that are grossly out of line may indicate a poor sample or process problems.

At the stack, the filter capture varied from 54.5% to 70.6% which is a reasonably narrow range, thus indicating that all the samples may be quite good. At the ESP-A, the filter capture varied from 28.3% to 47.0%. Most values were from 30-40%; thus, the 47.0% (Run 2) indicates potential problems. As noted in section 3.2.2.1, we experienced an analysis problem that probably explains this "outside" number. The ESP-B filter capture portion varied from 25.4% to 35.5%, which indicates good consistency.

Table 7 presents particulate and SO_2 collection efficiencies for each run based on LB/MMBTU. Run 2 indicated the lowest particulate efficiency (80.05%). All other values ranged from 85% to 91%. Our analytical problem with Run 2 could have resulted in a loss of part of the sample thus giving the lower emission rate (0.362 LB/MMBTU). However, that rate is not far out of line since several other values were noted in the 0.5 LB/MMBTU range. The key point is that the ESP outlet values are reasonably high and that the scrubber is 85 - 91% efficient in removing particulate. SO_2 removal efficiency was consistent, ranging from 89.98% to 95.04% (average 93.2%).

The following additional minor points should be considered in evaluating program results.

* The sample probes at the stack and ESP entered certain ports at less than 5° angles due to interferences (see data forms),

* Run 6 - ESP-B - had problems with velocity measurements on 2-4 ports due to rain causing condensate in lines - corrected by blowing lines,

* Run 3 - ESP-A - found small piece of styrofoam in impinger - probably came from storage locker - caused higher than normal vacuum during sampling.

Due to several cross-checks that were performed by Kenvirons, L G & E, and Bechtel, plus the fact that our calibrations and EPA interlaboratory participation results looked good, it appears that our results should be accurate within method expectations.

Im summary, aside from the minor discussed problems, all of the data and results appear to be representative of the process operation during testing.

TABLE 6

PARTICULATE SAMPLE DISTRIBUTION EVALUATION

	STACK					ESP-A					ESP-B				
Run	Filter Wt.	% of Total Wt.	Acetone Wt.	% of Total Wt.	Total Wt.	Filter Wt.	% of Total Wt.	Acetone Wt.	% of Total Wt.	Total Wt.	Filter Wt.	% of Total Wt.	Acetone Wt.	% of Total Wt.	Total Wt.
1	56.3	70.6	23.5	29.4	79.8	221.4	35.2	407.3	64.8	628.7	264.4	27.4	698.5	72.6	962.9
2	58.5	64.4	32.4	35.6	90.9	386.3	47.0	435.8	53.0	822.1	148.4	30.1	334.1	69.9	482.5
3	61.0	63.1	35.7	36.9	96.7	442.3	37.0	752.4	63.0	1194.7	397.7	26.2	1118.2	73.8	1515.9
4	58.6	64.3	32.6	35.7	91.2	358.1	33.1	722.8	66.9	1080.9	291.5	32.4	607.9	67.6	899.4
5	60.3	66.8	30.0	33.2	90.3	432.4	30.9	964.7	69.1	1397.1	313.5	29.3	755.1	70.7	1068.6
6	54.9	60.1	36.4	39.9	91.3	379.2	31.3	833.0	68.7	1212.2	499.5	27.9	1288.7	72.1	1788.2
7	44.2	54.5	36.9	45.5	81.1	248.9	34.6	469.6	65.4	718.5	291.8	31.7	629.9	68.3	921.7
8	47.2	61.9	29.1	38.1	76.3	302.8	37.4	505.7	62.6	808.5	286.7	35.5	518.9	64.5	805.6
9	67.5	68.6	30.9	31.4	98.4	323.6	35.7	583.8	64.3	907.4	315.8	25.4	926.2	74.6	1242.0
10	54.0	62.8	32.0	37.2	86.0	344.7	28.3	872.0	71.7	1216.7	218.9	30.8	491.3	69.2	710.2

TABLE 7

COLLECTION EFFICIENCIES

	Particulate (lb/MMBTU)			Particulate Efficiency (%)			SO_2 (lb/MMBTU)			SO_2 Efficiency (%)		
Run	A	B	Stack	A	B	Average	A	B	Stack	A	B	Average
#1	0.532	0.712	0.0895	83.18	87.43	85.305	5.99	5.84	0.348	94.19	94.04	94.115
#2	0.659	0.362	0.932	85.86	74.25	80.055	5.47	5.26	0.442	91.88	91.60	91.74
#3	0.947	1.07	0.111	88.28	89.63	88.955	5.720	5.93	0.430	92.48	92.75	92.615
#4	0.944	0.806	0.103	89.09	87.22	88.155	6.550	7.08	0.425	93.51	94.00	93.755
#5	1.110	0.920	0.102	90.08	88.91	89.495	6.040	6.510	0.364	93.97	94.41	94.19
#6	0.990	1.490	0.102	89.70	93.15	91.425	6.260	6.540	0.641	89.76	90.20	89.98
#7	0.589	0.847	0.102	82.68	87.96	85.32	5.100	5.290	0.357	93.00	93.25	93.125
#8	0.625	0.649	0.0893	85.71	86.24	85.975	5.330	5.190	0.335	93.71	93.55	93.63
#9	0.789	1.200	0.110	86.06	90.83	88.445	6.930	7.150	0.349	94.96	95.12	95.04
#10	0.962	0.593	0.102	89.40	82.80	86.10	5.900	5.890	0.359	93.92	93.90	93.91

Appendix E. Field Data Forms

(Sequence: ESP-A-(1-10); ESP-B-(1-10); and STK-(1-10))
(Start on pp E-1; E-94; and E-187)

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019
FACILITY L.G&E.
RUN NUMBER BEC-ESP-A-1

FIELD DATES 7-17-80/7-26-80
SAMPLING LOCATION ESP-OUTLET-A
SAMPLING DATE 17 July 1980

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 V. A. Lauritzen
2

ENGR. TECHNICIAN 1 J. J. Bralley
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-ESP-A-1 RECORDED BY: Tal

DATE: 17 July 1980 ASSISTED BY:

AMBIENT TEMPERATURE: 95 °F

BAROMETER PRESSURE: 29.66 in. Hg.

READING TIME: 0708 RECORDED BY: Tal

BAROMETER I.D. 102 CALIBRATION DATE: 5-29-80

CORRECTED BAROMETER PRESSURE: (@ console location) 29.61

CONSOLE I.D.: D-494

IN TEMP. DIAL THERMOMETER I.D.: II

OUT TEMP. DIAL THERMOMETER I.D.: I

PROBE I.D. 205 LENGTH: 10 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: IX IMPACT: A side STATIC: B side

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-311

COLD BOX DIAL THERMOMETER I.D.: A - 1" DIAL

HOT BOX DIAL THERMOMETER I.D.: A - 2" DIAL

THERMOCOUPLE I.D.: 21 (Kenvirons Shield) LENGHT: 12 FT.

NOZZLE I.D.: 231 SIZE: 0.238

UMBILICAL I.D.: Silver LENGTH: 50 FT

COMMENTS:

RUN NO BEC-ESP-A-1
DATE 17 July 1980

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY Vol
ASSISTED BY

I. PROBE ASSEMBLY

A. PROBE LENGTH 10 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER IX
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.238 IN.
B. NOZZLE IDENT. NO. 231
C. UMBILICAL LENGTH 50 FT.
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER 79149

III. IMPINGER CONTENT

		NORMAL		USE		FINAL	NET
NUMBER	TYPE*	MATERIAL	AMOUNT	MATERIAL	AMOUNT	AMOUNT	GAIN
1	GS	DW	100ML	80% IPA	521.9 g	522.8 g	0.1
2	M	DW	100ML	12% H_2O_2	554.3 g	602.6 g	48.3
3	GS	DRY	———	12% H_2O_2	572.5 g	588.8 g	16.3
4	M	ADSORBENT**	~200GM.	~200 SG	677.2	693.6 g	16.4
#4 CONTAINER WEIGHT = ____ GM.				TOTAL MOISTURE ADSORBED			81.1
WEIGHT WITH ADSORBENT = 677.2 GM.							

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER
** SG = SILICA GEL, D = DRIERITE, O = OTHER

IV. CONTROL CONSOLE: $\Delta H@$ (PRE-TEST) 1.55 $\Delta H@$ (POST-TEST) ____
Y (PRE-TEST) 1.03 Y (POST-TEST) ____

CONSOLE NO. D-494

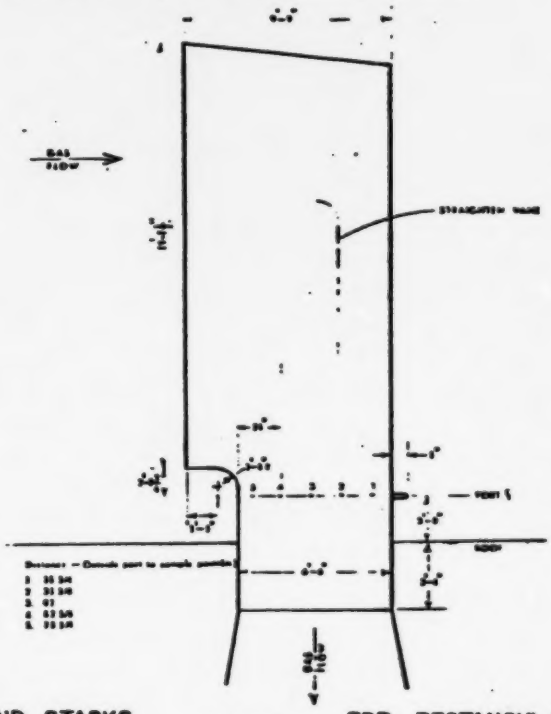
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☒ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☐ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-10 0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☒ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-10 0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☒ OTHER U-Tube Manometer

COMMENTS: ____

RUN NO. BEC-ESP-A-1 KENVIRONS, INC.

DATE 17 July 1980 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT _____ IN.

B. PORT LENGTH _____ IN.

STACK DIAMETER: (A-B) _____ IN.

STACK AREA: _____ IN.^{2}

FOR RECTANGULAR STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT 86 IN.

B. PORT LENGTH 8 IN.

STACK DEPTH: (A-B) 78 IN.

STACK WIDTH (INSIDE) 431 IN.

STACK AREA (DEPTH X WIDTH) 33618 IN.^{2}

EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$ _____ IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS

_____ DIAMETERS DOWNSTREAM OF

_____ DIAMETERS UPSTREAM OF

TYPE OF FLOW OBSTRUCTION

_____

_____

NUMBER OF SAMPLING POINTS

MIN. REQ'D. (METHOD 1) _____

USE 50

RUN NO. BEC-ESP-A-1 KENVIRONS, INC.
DATE 17 July 1980 TRAVERSE POINTS RECORDED BY

POINT	PERCENT OF DIAMETER FROM INSIDE PORT TO POINT — NUMBER OF TRAVERSE POINTS ON A DIAMETER												DISTANCE FROM INSIDE PORT (IN.)	DISTANCE FROM OUTSIDE PORT (IN.)	USE (IN.)
	2	4	6	8	10	12	14	16	18	20	22	24			
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1		15 3/4	
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2		31 3/8	
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5		47	
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9		62 5/8	
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5		78 1/4	
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2			
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1			
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4			
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0			
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2			
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3			
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8			
13							94.3	87.5	81.2	75.0	68.5	60.2			
14							98.2	91.5	85.4	79.6	73.8	67.7			
15								95.1	89.1	83.5	78.2	72.8			
16								98.4	92.5	87.1	82.0	77.0			
17									95.6	90.3	85.4	80.6			
18									98.6	93.3	88.4	83.9			
19										96.1	91.3	86.8			
20										98.7	94.0	89.5			
21											96.5	92.1			
22											98.9	94.5			
23												96.8			
24												98.9			

NOTE: SAME AS RUN NO. _____

COMMENTS: _____

RUN NO. BEC-ESP-A-1 KENVIRONS, INC. RECORDED BY Vale

DATE 17 July 1980 PRELIMINARY TRAVERSE ASSISTED BY JB

PORT-POINT	CLOCK TIME	VELOCITY HEAD ΔP (IN. H_2O)	STACK TEMP (F°)	PORT-POINT	CLOCK TIME	VELOCITY HEAD ΔP (IN. H_2O)	STACK TE (F°)
APPROX. AVERAGE				APPROX. AVERAGE			

STATIC PRESSURE = 15.5 IN. H_2O

☐ POS. ☒ NEG.

PITOT LEAK CHECKS*			
OPENING	PRE-TRAVERSE	POST-TRAVERSE	BY
IMPACT	☐ STABLE ☐ LEAKING	☐ STABLE ☐ LEAKING	
STATIC	☐ STABLE ☐ LEAKING	☐ STABLE ☐ LEAKING	

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

KENVIRONS, INC.
PRELIMINARY
MOISTURE DETERMINATION

RUN NO. BEC-ESP-A-1 RECORDED BY val
DATE 17 July 1980 ASSISTED BY _____

NOTE: SAME AS RUN _____

A. CONDENSER AND/OR SILICA GEL METHOD

BAROMETRIC PRESSURE _____ READING TIME _____
BAROMETER LOCATION _____ READING BY _____

	CLOCK TIME	VOLUME METER(cf)	ORIFICE SETTING	METER TEMP IN	METER TEMP OUT
FINAL					
INITIAL					
DIFFERENCE				Avg. TM	

$VMSTD = 17.65(Y) \frac{VM \times PM}{TM + 460}$

$= \frac{\quad}{\quad}$

$= 17.65 (\quad)$

$= \_\_\_\_\_$ DSCF

CONTAINER	FINAL	INITIAL	DIFFERENCE (D)	CONVERSION TO STD.	
CONDENSER				D × 0.04707 =	VWC
SG TUBE				D × 0.04715 =	VWSG

$$\text{MOISTURE CONTENT} = \frac{(VWC + VWSG)100}{VWC + VWSG + VMSTD} = \frac{(\quad + \quad)100}{\quad + \quad} = \_\_\_\_\_ \%$$

B. PREDETERMINED VALUE

% MOISTURE 8 BASIS Previous tests

LEAK CHECK*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)		
TIME (24 HOUR CLOCK)		
BY		

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum are acceptable.

COMMENTS: _____

RUN NO. BEC-ESP-A-1 | KENVIRONS, INC. | RECORDED BY Val
DATE 17 July 1980 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 95	°F
	BAROMETRIC PRESSURE Pb = 29.66		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − 0.05) =	29.61	IN. Hg.
ΔH@	REFERENCE ΔH	= 1.55	IN. H_2O
TM	AVG. METER TEMPERATURE	= 115	°F
% H_2O	MOISTURE CONTENT	= 8	% BY VOL.
Po	STATIC (GUAGE) PRESSURE IN STACK	= −15.5	IN. H_2O
	x 0.074	= −1.15	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 28.46	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.61	IN. Hg.
PS/PM	=		
C	CORRECTION FACTOR	= 0.845	
TS	STACK TEMPERATURE	= 250	°F
ΔP	AVERAGE STACK VELOCITY HEAD	=	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	=	IN. H_2O
D	PROBE TIP DIAMETER	= 0.238	IN.

16.5 × .074 = 1.22; 1085 − 1.15 = 1.7; 29.61 − 1.15 = 28.46

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	250	275	300	325	350
ΔPREF	0.84	0.88	0.90	~~0.94~~ 0.93	0.96

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	Val	☑ STABLE ☐ LEAKING	Val
STATIC	☑ STABLE ☐ LEAKING	Val	☑ STABLE ☐ LEAKING	Val

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	~~0.011~~ 0.013 CFM @ 15" Hg.	0.005 CFM @ 7.7" Hg
TIME (24 HOUR CLOCK)	~~0905~~ 1155	1737
BY	Val	Val

*Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-1
DATE 17 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY [illegible]
ASSISTED BY JB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AA - 1	1428	115.896 / 116.70	0.20	0.44	97	95	262	245		4.2	1
" 2	1430	missed	0.35	0.72	101	97	322	260		5.2	2
" 3	1432	118.62	0.31	0.63	102	97	334	260	68	5.0	
" 4	1434	119.56	0.35	0.67	104	98	337	270	67	5.1	3
" 5	1436	120.55	0.40	0.76	106	98	341	280	68	5.6	
AB - 1	1444	121.39	0.24	0.54	102	99	200	260		4.2	4
" 2	1446	122.37	0.40	0.82	106	99	306	255		5.8	5
" 3	1448	123.39	0.40	0.82	107	100	333	260	68	6.0	
" 4	1450	124.36	0.35	0.68	108	100	341	270	67	5.2	6
" 5	1452	125.39	0.43	0.83	109	100	341	285	67	6.0	
AC - 1	1456	126.12	0.18	0.40	104	101	154	280		3.7	7
" 2	1458	126.98	0.31	0.63	108	101	308	295		4.9	8
" 3	1500	127.87	0.30	0.61	109	101	331	290	73	4.9	
" 4	1502	128.70	0.26	0.50	110	102	335	275	71	4.2	9
" 5	1504	129.56	0.29	0.56	110	102	345	280	72	4.7	
AD - 1	1510	130.26	0.17	0.38	106	103	195	285		3.3	10
" 2	1512	131.03	0.23	0.47	109	103	308	290	77	4.0	11
" 3	1514	131.83	0.25	0.48	110	103	338	280	74	4.1	12
" 4	1516	132.60	0.23	0.44	111	103	339	285	73	3.9	
" 5	1518	133.42	0.27	0.52	111	104	389	285	70	4.2	

COMMENTS: 1. Nomograph set for 250°
2. Nomograph set for 300°
3. Nomograph set for 350°
4. " " " 250°
5. " " " 300°
6. " " " 350°
7. " " " 250°
8. " " " 300°
9. Nomograph set for 350°
10. " " " 250°
11. " " " 300°
12. " " " 350°
13.
14.
15.
16.

250/0.64 275/0.88 200/0.90 325/0.93 350/0.96

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-1
DATE 17 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Dal
ASSISTED BY JB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg.)	COMMENT NUMBER
AE-1	1540	133.87	0.07	0.15	102	104	140	255		2.1	1
" 2	1542	134.34	0.05	0.10	104	105	201	255		<2	2
" 3	1544	134.68	0.09	0.17	105	105	324	255	81	missed	3
" 4	1546	135.32	0.18	0.34	107	105	330	255	71	3.3	
" 5	1548	135.98	0.17	0.33	108	105	329	260	72	3.3	
AF-1	1556	136.51	0.08	0.17	103	103	291	245		2.2	4, 6
" 2	1558	137.09	0.13	0.26	105	104	302	245		2.9	5
" 3	1600	137.61	0.09	0.18	105	104	320	250	72	2.5	
" 4	1602	138.32	0.21	0.42	108	104	320	250	68	3.9	
" 5	1604	139.12	0.22	0.45	109	104	322	250	66	4.1	8
AG-1	1614	139.74	0.14	0.29	104	103	288	245		3.0	
" 2	1616	140.56	0.27	0.56	108	103	304	245		4.7	
" 3	1618	141.43	0.28	0.57	110	104	315	245	66	4.8	
" 4	1620	142.30	0.27	0.56	110	104	312	245	67	4.7	
" 5	1622	143.21	0.32	0.65	111	104	305	245	67	5.0	
AH-1	1628	144.06	0.25	0.52	106	103	287	240		4.3	
" 2	1630	144.98	0.32	0.65	109	104	293	235		5.0	
" 3	1632	145.93	0.34	0.70	110	104	306	240	70	5.2	
" 4	1634	146.86	0.31	0.63	111	104	306	240	69	5.0	
" 5	1636	147.87	0.39	0.80	111	104	304	230	68	6.0	

COMMENTS: 1. NOMOGRAPH SET FOR 250°
2. " " " 300°
3. " " " 350°
4. " " " 250°
5. " " " 300°
6. when starting point AF-1, couldn't get Δ H below 0.18 and had no vacuum. Checked all
7. glassware - all OK. Restarted point - all was normal. Sampled 23 sec. extra
8. NOMOGRAPH SET FOR 300°
9.
10.
11.
12.
13.
14.
15.
16.

250/0.84 275/0.88 300/0.90 325/0.93 350/0.96

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-1
DATE 17 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Vol
ASSISTED BY J B

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AI-1	1644	148.87	0.36	0.75	106	103	269	250		5.7	
" 2	1646	149.92	0.41	0.84	109	103	292	250		6.2	
" 3	1648	150.95	0.41	0.84	110	104	295	245	64	6.2	
" 4	1650	152.03	0.42	0.86	111	104	299	240	63	6.3	
" 5	1652	153.11	0.44	0.90	112	104	297	235	66	6.6	
AJ-1	1716	154.09	0.35	0.72	102	102	281	245		5.5	
" 2	1718	155.14	0.41	0.84	106	103	285	255		6.2	
" 3	1720	156.22	0.43	0.88	108	103	295	250	63	6.3	
" 4	1722	157.33	0.45	0.92	109	103	296	245	62	6.8	
" 5	1724	158.491	0.52	1.05	110	103	288	245	62	7.2	1

COMMENTS: 1. Purged impingers at 0.50 Δ H 1744 to 1759

2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.84 275/0.88 300/0.90 325/0.93 350/0.96

RUN NO. BEC-ESP-A-1

DATE 17 July 1980

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY Tal

ASSISTED BY J B

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? ___

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE ~48 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1420	AD	1	11.5	8.0
1530	AD	2	12.5	7.0
1722	AI		12.0	8.0
			12.0	7.67

COMMENTS: ___

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY L.G.&E.

RUN NUMBER BEC-ESP-A-2

FIELD DATES 7-17-80 / 7-26-80

SAMPLING LOCATION ESP-OUTLET-A

SAMPLING DATE 18 July 1980

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 V.A. Lauritzen
2

ENGR. TECHNICIAN 1 J.J. Bralley
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-ESP-A-2 RECORDED BY: VDL

DATE: 19 July 1980 ASSISTED BY:

AMBIENT TEMPERATURE: 95 °F

BAROMETER PRESSURE: 29.80 in. Hg.

READING TIME: 0735 RECORDED BY: GHR

BAROMETER I.D. 102 CALIBRATION DATE: 5-29-80

CORRECTED BAROMETER PRESSURE: (@ console location) 29.75

CONSOLE I.D.: D-494

IN TEMP. DIAL THERMOMETER I.D.: XI

OUT TEMP. DIAL THERMOMETER I.D.: V

PROBE I.D. 205 LENGTH: 10 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: IX IMPACT: A side STATIC: B side

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-311

COLD BOX DIAL THERMOMETER I.D.: A - 1" DIAL

HOT BOX DIAL THERMOMETER I.D.: A - 2" DIAL

THERMOCOUPLE I.D.: 21 (Kenvirons Shield) LENGHT: 12 FT.

NOZZLE I.D.: 231 SIZE: 0.238

UMBILICAL I.D.: Silver LENGTH: 50 FT.

COMMENTS:

RUN NO BEC-ESP-A-2
DATE 18 July 1980

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY Val
ASSISTED BY J. J. B

I. PROBE ASSEMBLY

A. PROBE LENGTH 10 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER IX
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.238 IN
B. NOZZLE IDENT. NO. 231
C. UMBILICAL LENGTH 50 F
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER 79152

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE MATERIAL	USE AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	522.7gm	532.9gm	10.2g
2	M	DW	100ML	12% H_2O_2	556.4gm	608.0gm	45.6g
3	GS	DRY	———	12% H_2O_2	571.0gm	588.1gm	17.1g
4	M	ADSORBENT**	~200GM.	~200 SG	628.3gm	647.0gm	18.7g
#4 CONTAINER WEIGHT = ____ GM.				TOTAL MOISTURE ADSORBED			91.6
WEIGHT WITH ADSORBENT = 628.3 GM.							

Dr RST

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

IV CONTROL CONSOLE: Δ Hθ (PRE-TEST) 1.55 Δ Hθ (POST-TEST) ____
Y (PRE-TEST) 1.03 Y (POST-TEST) ____

CONSOLE NO. D-494

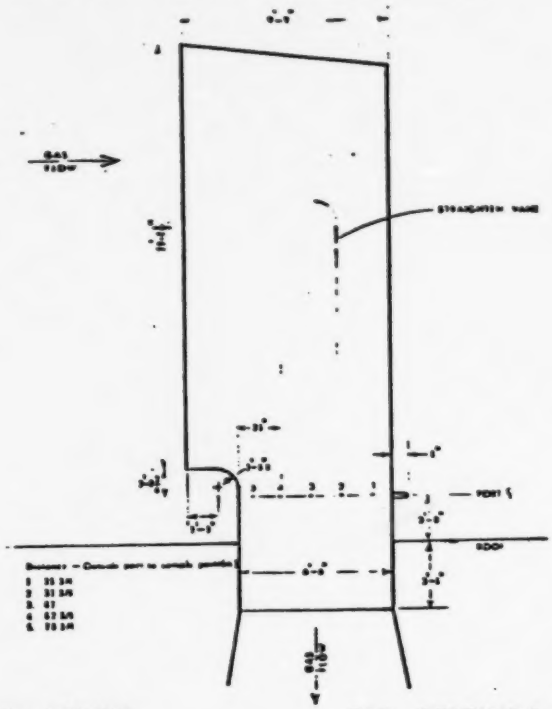
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☒ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☐ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-10 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☒ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☒ OTHER U-Tube Manometer

COMMENTS: ____

RUN NO. BEC-ESP-A-2 KENVIRONS, INC.

DATE 18 July 1980 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT _____ IN.

B. PORT LENGTH _____ IN.

STACK DIAMETER: (A-B) _____ IN.

STACK AREA: _____ IN.^{2}

FOR RECTANGULAR STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT 86 IN.

B. PORT LENGTH 8 IN.

STACK DEPTH: (A-B) 78 IN.

STACK WIDTH (INSIDE) 431 IN.

STACK AREA (DEPTH X WIDTH) 33618 IN.^{2}

EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$ _____ IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS _____ ' DIAMETERS DOWNSTREAM OF _____

_____ DIAMETERS UPSTREAM OF _____

TYPE OF FLOW OBSTRUCTION

NUMBER OF SAMPLING POINTS

MIN. REQ'D. (METHOD 1) _____

USE 50

RUN NO. BEC-ESP-A-2 | KENVIRONS, INC. | RECORDED BY TAL
DATE 18 July 1980 | NOMOGRAPH DATA | CHECKED BY _____

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 95	°F
	BAROMETRIC PRESSURE Pb = 29.80		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − 0.03) =	29.75	IN. Hg.
ΔH@	REFERENCE ΔH	= 1.55	IN. H_2O
TM	AVG. METER TEMPERATURE	= 105	°F
% H_2O	MOISTURE CONTENT	= 8	% BY VOL.
Po	STATIC (GUAGE) PRESSURE IN STACK	= −15.0	IN. H_2O
	x 0.074	= −1.11	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 28.64	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.75	IN. Hg.
PS/PM	= _____		
C	CORRECTION FACTOR	= 0.83	
Ts	STACK TEMPERATURE	= _____	°F
ΔP	AVERAGE STACK VELOCITY HEAD	= _____	IN. H_2O
ΔPMAX	MAXIMUM STACK VELOCITY HEAD	= _____	IN. H_2O
D	PROBE TIP DIAMETER	= 0.238	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	250	275	300	325	350
ΔPREF	0.85	0.88	0.91	0.94	0.97

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	TAL	☑ STABLE ☐ LEAKING	TAL
STATIC	☑ STABLE ☐ LEAKING	TAL	☑ STABLE ☐ LEAKING	TAL

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.018 CFM @ 15" Hg.	0.011 CFM @ 9" Hg.
TIME (24 HOUR CLOCK)	0850	1350
BY	TAL	TAL

*Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.

RUN NO. BEC-ESP-A-2 PARTICULATE RECORDED BY val

DATE 18 July 1980 SAMPLING. ASSISTED BY J.J.B

SAMPLING TIME PER POINT 2 MIN.

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AJ-1	1100	166.670 167.75	0.42	0.85	97	96	269	270		6.8 ~~7.0~~	1
AJ" 2	1102	168.86	0.50	1.00	100	97	280	270		7.0	
AJ" 3	1104	170.00	0.50	1.00	102	98	288	270	60	7.0	
" 4	1106	171.13	0.49	0.99	104	98	292	265	60	6.9	
" 5	1108	172.35	0.60	1.20	106	99	288	265	60	8.0	
AI-1	1130	173.37	0.39	0.80	97	96	270	255		5.9	
" 2	1132	174.46	0.47	0.96	101	98	301 ~~292~~	250		6.6	
" 3	1134	175.56	0.47	0.96	104	98	304	255	58	6.6	
" 4	1136	176.68	0.47	0.96	105	99	306	250	58	6.7	
" 5	1138	177.87	0.56	1.15	107	100	306	255	59	7.6	
AH-1	1146	178.73	0.28	0.57	98	101	270	255		4.8	
" 2	1148	179.65	0.33	0.67	105	99	308	255		5.0	
" 3	1150	180.63	0.38	0.77	107	99	313	255	64	5.6	
" 4	1152	181.57	0.33	0.67	107	99	313	255	62	5.1	
" 5	1154	182.58	0.40	0.81	108	100	316	260	61	5.9	
AG-1	1200	183.23	0.15	0.31	101	99	276	250		3.3	
" 2	1202	184.07	0.29	0.59	105	100	314	250		4.8	
" 3	1204	184.96	0.30	0.60	107	100	323	250	64	4.9	
" 4	1206	185.86	0.30	0.60	108	101	322	250	62	4.9	
" 5	1208	186.85	0.38	0.77	109	101	316	255	61	5.8	

COMMENTS: 1. AMMEGRAPH SET FOR 300°

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

16.

350/0.85 375/0.88 300/0.91 325/0.94 350/0.97

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-2 RECORDED BY Val
DATE 18 July 1980 ASSISTED BY J. J. B
SAMPLING TIME PER POINT 2 MIN.

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AF-1	1214	187.30	0.08	0.16	101	101	301	250		2.4	
" 2	1216	187.83	0.11	0.22	104	102	308	245		2.9	
" 3	1218	188.30	0.08	0.16	104	102	328	250	68	2.4	
" 4	1220	189.03	0.22	0.45	107	102	331	250	67	4.1	
" 5	1222	189.82	0.23	0.47	108	102	333	250	66	4.2	
AE-1	1232	190.23	0.06	0.13	101	101	189 ~~175~~	250		2.2	1
" 2	1234	190.54	0.03	0.06	102	102	317	~~350~~ ~~347~~		<2	
" 3	1234	190.97	0.08	0.16	103	103	329	250	72	2.3	2
" 4	1236	191.67	0.19	0.39	107	103	340	255	68	3.8	
" 5	1238	192.42	0.22	0.44	109	104	340	255	63	4.0	
AD-1	1244	193.06	0.15	0.30	104	103	307	255		3.2	~~3~~
" 2	1246	193.86	0.24	0.49	108	103	317	255		4.2	
" 3	1248	194.70	0.28	0.56	109	103	345	250	66	4.6	
" 4	1250	195.54	0.27	0.52	110	103	343	255	64	4.4	4
" 5	1252	196.40	0.30	0.57	110	103	330	260	63	4.8	
AC-1	1300	197.18	0.21	0.45	105	102	215	260		4.1	5
" 2	1302	198.08	0.33	0.67	109	103	315	260		5.3	6
" 3	1304	199.05	0.35	0.72	111	103	340	260	68	5.8	
" 4	1306	199.96	0.32	0.61	111	104	345	260	66	5.1	7
" 5	1308	200.90	0.36	0.69	112	104	351	260	66	5.7	

COMMENTS: 1. SET AUTOGRAPH FOR 250°
2. " " " 300°
3. ~~" " " 350°~~
4. " " " 350°
5. " " " 250°
6. " " " 300°
7. " " " 350°
8.
9.
10.
11.
12.
13.
14.
15.
16.

350/1 oz 275/0.98 300/0.91 325/0.94 350/0.97

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-2
DATE 15 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY gal
ASSISTED BY J.J.B.

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AB-1	1314	201.75	~~0.34~~ 0.25	0.54	107	103	250	260		4.8	1
" 2	1316	202.79	0.45	~~0.45~~ 0.91	112	104	311	265		6.9	2
" 3	1318	203.83	0.44	0.84	113	105	338	265	58	6.6	3
" 4	1320	204.82	0.38	0.72	113	105	348	265	59	5.9	
" 5	1322	205.87	0.45	0.87	114	105	348	265	60	6.8	
AA-1	1330	206.68	0.24	0.49	107	105	305	250		4.8	4
" 2	1332	207.71	0.40	0.81	112	105	328	250		6.5	
" 3	1334	208.70	0.37	0.75	114	106	346	250	62	7.3	
" 4	1336	209.70	0.39	0.74	114	106	349	250	63	6.1	5
" 5	1338	210.784	0.46	0.89	115	106	352	255	63	7.2	
											6

COMMENTS: 1. SET NOMOGRAPH FOR 250°
2. " " " 300°
3. " " " 350°
4. " " " 300°
5. " " " 350°
6. Purged glassware @ 0.50 Δ H from 1355 to 1415
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.85 275/0.88 300/0.91 325/0.94 350/0.97

RUN NO. BEC-ESP-A-2

DATE 18 July 1980

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY [illegible]

ASSISTED BY J.J.B

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? _____

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE ~48 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1148	AE	1	12.5	7.5
1222	AD	2	12.5	7.0
1324	AA	3	11.0	8.0
			12.0	7.5

CA RST

COMMENTS: _____

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019
FACILITY L.G&E.
RUN NUMBER BEC-ESP-A-3

FIELD DATES 7-17-80 / 7-26-80
SAMPLING LOCATION ESP-OUTLET-A
SAMPLING DATE 19 July 1980

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 V.A. Lauritzen
2

ENGR. TECHNICIAN 1 J.J. Bradley
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-ESP-A-3 RECORDED BY: [illegible]

DATE: 19 July 1980 ASSISTED BY:

AMBIENT TEMPERATURE: 95 °F

BAROMETER PRESSURE: 29.86 in. Hg.

READING TIME: 0800 RECORDED BY: GR

BAROMETER I.D. 102 CALIBRATION DATE: 5-29-80

CORRECTED BAROMETER PRESSURE: (@ console location)

CONSOLE I.D.: D-494

IN TEMP. DIAL THERMOMETER I.D.: XI

OUT TEMP. DIAL THERMOMETER I.D.: X

PROBE I.D. 205 LENGTH: 10 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: IX IMPACT: A side STATIC: B side

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-311

COLD BOX DIAL THERMOMETER I.D.: A - 1" DIAL

HOT BOX DIAL THERMOMETER I.D.: A - 2" DIAL

THERMOCOUPLE I.D.: 21 (Kenvirons Shield) LENGHT: 12 FT.

NOZZLE I.D.: 231 SIZE: 0.238

UMBILICAL I.D.: Silver LENGTH: 50 FT

COMMENTS:

RUN NO BEC-ESP-A-3
DATE 19 July 1980

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY vah
ASSISTED BY JJB

I. PROBE ASSEMBLY

A. PROBE LENGTH 10 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER IX
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.238 IN.
B. NOZZLE IDENT. NO. 231
C. UMBILICAL LENGTH 50 FT
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER ~~79155~~ 79156

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE MATERIAL	USE AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	525.5 gm	538.3 gm	12.8
2	M	DW	100ML	12% H_2O_2	552.1 gm	596.8 gm	44.7
3	GS	DRY	———	12% H_2O_2	571.7 gm	592.0 gm	20.3
4	M	ADSORBENT**	~200GM.	~200 SG	627.7 gm	647.8 gm	20.1
#4 CONTAINER WEIGHT = ____ GM. WEIGHT WITH ADSORBENT = 627.7 GM.				TOTAL MOISTURE ADSORBED			97.9

CN PO RST

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

IV CONTROL CONSOLE: $\Delta H@$ (PRE-TEST) 1.55 $\Delta H@$ (POST-TEST) ____
Y (PRE-TEST) 1.03 Y (POST-TEST) ____

CONSOLE NO. D-494

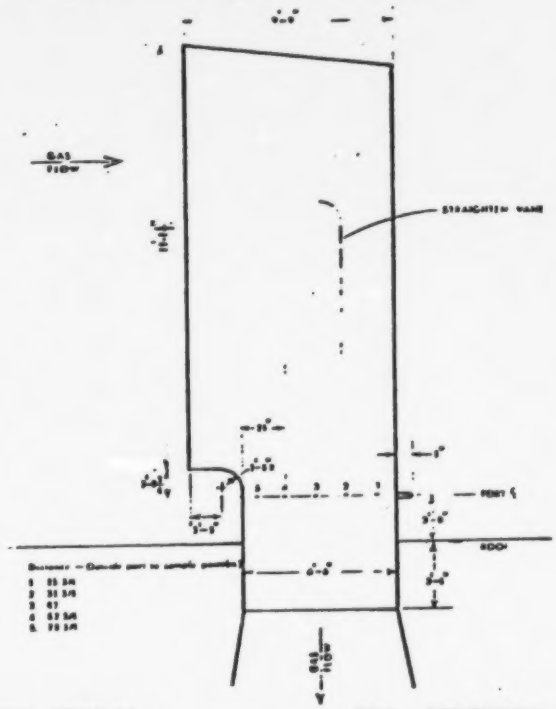
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☐ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☐ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☐ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENITIVITY (RANGE ____) ☐ OTHER U-Tube Manometer

COMMENTS: ____

RUN NO. BEC- ESP- A-3 KENVIRONS, INC.

DATE 19 July 1980 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT _____ IN.

B. PORT LENGTH _____ IN.

STACK DIAMETER: (A-B) _____ IN.

STACK AREA: _____ IN.^{2}

FOR RECTANGULAR STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT 86 IN.

B. PORT LENGTH 8 IN.

STACK DEPTH: (A-B) 78 IN.

STACK WIDTH (INSIDE) 431 IN.

STACK AREA (DEPTH X WIDTH) 33618 IN.^{2}

EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$ _____ IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS	TYPE OF FLOW OBSTRUCTION	NUMBER OF SAMPLING POINTS
_____ DIAMETERS DOWNSTREAM OF	_____	MIN. REQ'D. (METHOD 1) _____
_____ DIAMETERS UPSTREAM OF	_____	USE 50

RUN NO. BEC-ESP-A-3 | KENVIRONS, INC. | RECORDED BY vah
DATE 19 July 1980 | NOMOGRAPH DATA | CHECKED BY _____

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 95	°F
	BAROMETRIC PRESSURE Pb = 29.86		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − 0.05)	= 29.81	IN. Hg.
ΔH @	REFERENCE ΔH	= 1.55	IN. H_2O
TM	AVG. METER TEMPERATURE	= 105	°F
% H_2O	MOISTURE CONTENT	= 9	% BY VOL.
PO	STATIC (GUAGE) PRESSURE IN STACK	= −15.1	IN. H_2O
	x 0.074	= −1.12	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 28.69	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.81	IN. Hg.
PS/PM	= _____		
C	CORRECTION FACTOR	= 0.816	
TS	STACK TEMPERATURE	= _____	°F
ΔP	AVERAGE STACK VELOCITY HEAD	= _____	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	= _____	IN. H_2O
D	PROBE TIP DIAMETER	= 0.238	IN.

15.1
.074
1.04
1057
1.1174

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	250	275	300	325	350
ΔPREF	0.85		0.91		0.98

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	vah	☑ STABLE ☐ LEAKING	vah
STATIC	☑ STABLE ☐ LEAKING	vah	☑ STABLE ☐ LEAKING	vah

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.018 CFM @ 15" Hg.	0.016 CFM @ 15" Hg
TIME (24 HOUR CLOCK)	1020	1312
BY	vah	vah

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING.

RUN NO. BEC-ESP-A-3
DATE 19 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Tal
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AA - 1	1034 ~~1034~~	223.300 ~~224.09~~	0.22	0.44	101	97	284	265		4.0	1
" 2	1038	225.10	0.40	0.80	106	98	318	265		5.2	
" 3	1040	226.07	0.34	0.68	108	98	344	260	62	4.9	
" 4	1042	227.05	0.37	0.70	110	100	351	260	62	5.0	2
" 5	1044	228.10	0.44	0.84	111	100	354	260	61	5.6	
AB - 1	1050	228.91	0.24	0.48	106	101	264	260		3.9	3
" 2	1052	229.99	0.45	0.91	112	101	304	260		6.0	
" 3	1054	231.06	0.44	0.84	113	102	342	260	62	5.7	4
" 4	1056	232.06	0.38	0.72	114	103	353	260	61	5.1	
" 5	1058	233.13	0.46	0.86	115	104	351	265	62	5.9	5
AC - 1	1104	233.97	0.22	0.52	109	104	141	270		4.1	6
" 2	1106	234.92	0.34	0.69	112	104	305	265		5.0	7
" 3	1108	235.86	0.34	0.64	113	105	338	260	64	4.8	8
" 4	1110	236.75	0.30	0.56	113	105	345	265	64	4.4	
" 5	1112	237.69	0.35	0.66	114	105	353	270	64	5.0	
AD - 1	1118	238.36	0.15	0.32	107	104	210	275		3.2	9
" 2	1120	239.17	0.26	0.53	111	104	309	275		4.2	10
" 3	1122	240.03	0.28	0.53	112	105	342	270	68	4.2	11
" 4	1124	240.87	0.30	0.56	113	105	343	275	66	4.2	
" 5	1126	241.74	0.31	0.58	113	105	331	275	67	4.5	

COMMENTS:
1. NOMOGRAPH SET FOR ~~350°~~ 300°
2. " " " 350°
3. " " " 300°
4. " " " 350
5. ANGLE OF PROBE MEASURED AS 4.5°
6. NOMOGRAPH SET FOR 350°
7. " " " 300°
8. " " " 350°
9. SET NOMOGRAPH FOR 350°
10. " " " 300°
11. " " " 350°
12.
13.
14.
15.
16.

350/0.95 300/0.91 350/0.95

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-3
DATE 19 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Val
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AE-1	1134	242.20	0.07	0.15	105	104	243	280		2.2	1
" 2	1136	242.66	0.07	0.14	107	105	316	275		2.2	2
" 3	1138	243.21	0.11	0.22	108 ~~107~~	105 ~~104~~	326	270	72	2.9	
" 4	1140	243.90	0.19	0.36	111	106	337	265	72	3.6	3
" 5	1142	244.64	0.22	0.41	111	106	334	270	71	3.8	
AF-1	1148	245.20	0.10	0.22	106	105	210	275		2.8	4
" 2	1150	245.74	0.10	0.20	107	105	315	270		2.8	5
" 3	1152	246.36	0.09	0.18	107	105	323	270	80	2.6	
" 4	1154	247.02	0.24	0.49	110	105	325	265	77	4.2	
" 5	1156	247.90	0.28	0.57	112	105	327	275	70	4.8	
AG-1	1202	248.57	0.16	0.32	106	104	295	260		3.2	
" 2	1204	249.45	0.30	0.60	110	104	309	255		4.9	
" 3	1206	250.37	0.31	0.62	112	104	323	255	68	5.0	
" 4	1208	251.29	0.31	0.62	112	104	320	255	66	5.0	
" 5	1210	252.29	0.37	0.75	113	104	315	260	65	5.8	
AH-1	1216	253.28	0.33	0.72	107	103	257 ~~250~~	250		5.5	6
" 2	1218	254.27	0.37	0.75	111	103	312	250		5.9	7
" 3	1220	255.32	0.40	0.81	112	104	317	250	66	6.1	
" 4	1222	256.31	0.35	0.72	112	104	316	250	65	5.8	
" 5	1224	257.40	0.47	0.95	113	104	314	255	65	8.8	

COMMENTS: 1. SET NOMOGRAPH FOR 250°
2. " " " 300°
3. " " " 350°
4. " " " 250°
5. " " " 300°
6. " " " 250°
7. " " " 300°
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.95 300/0.91 350/0.98

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-3
DATE 19 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Wah
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AI-1	1230	258.51	0.44	0.90	108	103	285	255		6.5	
" 2	1232	259.60	0.45	0.92	111	104	301	260		10.5	
" 3	1234	260.74	0.49	0.97	112	105	303	255	64	13.0	
" 4	1236	261.87	0.50	1.00	112	104	305	255	64	14.5	
" 5	1238	263.09	0.55	1.10	112	105	304	260	64	15.0	
AJ-1	1254	264.20	0.44	0.90	106	103	277	265		6.7	
" 2	1256	265.37	0.52	1.05	111	104	292	265		7.5	
" 3	1258	266.52	0.48	0.97	114	105	297	265	64	7.1	
" 4	1300	267.67	0.48	0.97	115	105	370	260	62	7.1	
" 5	1302	268.890	0.58	1.15	116	106	340	265	62	8.2	1

COMMENTS: 1. Purged glassware @ 0.50 Δ H from 1316 to 1333
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.85 300/0.91 350/0.98

RUN NO. BEC-ESP-A-3

DATE 19 July 1980

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY vah

ASSISTED BY JJB

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? ___

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE ~48 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1108	AD	1	13.5	6.0
1204	AF	2	11.5	6.5
1320	AE	3	10.5	4.5
	CO_2	OK use	Beside	O_2
			11.5%	7.7%

COMMENTS: ___

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY L.G.&E.

RUN NUMBER BEC-ESP-A-4

FIELD DATES 7-17-80/7-26-80

SAMPLING LOCATION ESP-OUTLET-A

SAMPLING DATE 20 July 1980

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 V.A. Lauritzen
2

ENGR. TECHNICIAN 1 J.J. Braley
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-ESP-A-4 RECORDED BY: [illegible]

DATE: 20 July 1980 ASSISTED BY:

AMBIENT TEMPERATURE: 95 °F

BAROMETER PRESSURE: 29.85 in. Hg.

READING TIME: ~~[illegible]~~ 0745 RECORDED BY: [illegible]

BAROMETER I.D. ~~[illegible]~~ 102 CALIBRATION DATE: 6-29-80

CORRECTED BAROMETER PRESSURE: (@ console location)

CONSOLE I.D.: D-494

IN TEMP. DIAL THERMOMETER I.D.: II

OUT TEMP. DIAL THERMOMETER I.D.: I

PROBE I.D. 205 LENGTH: 10 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: IX IMPACT: A side STATIC: B side

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-311

COLD BOX DIAL THERMOMETER I.D.: A - 1" DIAL

HOT BOX DIAL THERMOMETER I.D.: A - 2" DIAL

THERMOCOUPLE I.D.: 21 (Kenvirons Shield) LENGHT: 12 FT.

NOZZLE I.D.: 231 SIZE: 0.238

UMBILICAL I.D.: Silver LENGTH: 50 FT

COMMENTS:

RUN NO BEC-ESP-A-4
DATE 20 July 1980

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY vrl
ASSISTED BY JJB

I. PROBE ASSEMBLY

A. PROBE LENGTH 10 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER IX
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.238 IN.
B. NOZZLE IDENT. NO. 231
C. UMBILICAL LENGTH 50 FT.
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER 79159

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE MATERIAL	USE AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	522.5 gm JJB	543.1 gm vrl	20.6
2	M	DW	100ML	12% H_2O_2	556.1 gm JJB	599.5 gm vrl	43.4
3	GS	DRY	———	12% H_2O_2	571.6 gm JJB	587.3 gm vrl	15.7
4	M	ADSORBENT**	~200GM.	~200 SG	669.1 gm JJB	685.4 gm vrl	16.3
#4 CONTAINER WEIGHT = ____ GM. WEIGHT WITH ADSORBENT = 669.1 GM.				TOTAL MOISTURE ADSORBED			96.0

CA RST RO

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

IV CONTROL CONSOLE: $\Delta H@$ (PRE-TEST) 1.55 $\Delta H@$ (POST-TEST) ____
Y (PRE-TEST) 1.03 Y (POST-TEST) ____

CONSOLE NO. D-494

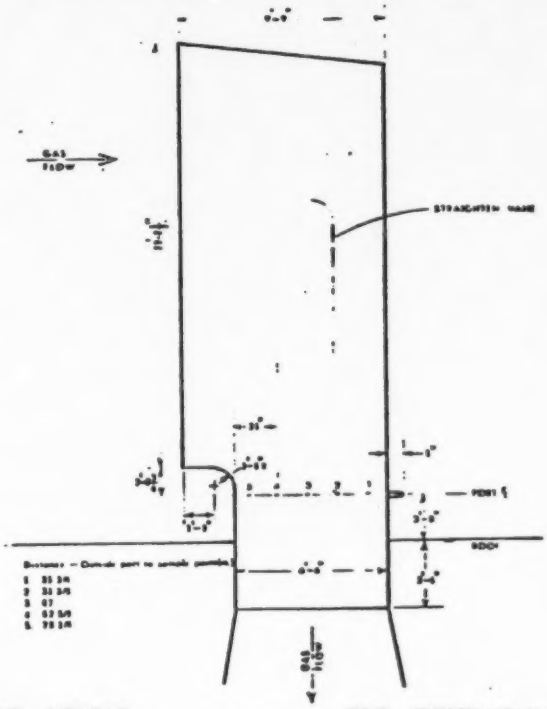
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☒ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☐ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (~~0-5~~ 0-10 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☒ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENITIVITY (RANGE ____) ☒ OTHER U-Tube Manometer

COMMENTS: ____

RUN NO. BEC-ESP-A-4 KENVIRONS, INC.

DATE 20 July 1980 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT _____ IN

B. PORT LENGTH _____ IN

STACK DIAMETER: (A-B) _____ IN

STACK AREA: _____ IN.^{2}

FOR RECTANGULAR STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT 86 IN

B. PORT LENGTH 8 IN

STACK DEPTH: (A-B) 78 IN

STACK WIDTH (INSIDE) 431 IN

STACK AREA (DEPTH X WIDTH) 33618 IN.^{2}

EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$ _____ IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS		TYPE OF FLOW OBSTRUCTION
_____	DIAMETERS DOWNSTREAM OF	_____
_____	DIAMETERS UPSTREAM OF	_____

NUMBER OF SAMPLING POINTS

MIN. REQ'D. (METHOD 1) _____

USE 50

RUN NO. BEC-ESP-A-4 | KENVIRONS, INC. | RECORDED BY Val
DATE 20 July 1980 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 95	°F
	BAROMETRIC PRESSURE Pb = 29.85		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb−0.05) =	29.80	IN. Hg.
ΔH @	REFERENCE ΔH	= 1.55	IN. H_2O
TM	AVG. METER TEMPERATURE	= 115 ~~105~~	°F
% H_2O	MOISTURE CONTENT	= 9	% BY VOL.
Po	STATIC (GUAGE) PRESSURE IN STACK	= −14.2	IN. H_2O
	x 0.074	= −1.05	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 28.75	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.80	IN. Hg.
PS/PM	=		
C	CORRECTION FACTOR	= ~~0.818~~ 0.83	
Ts	STACK TEMPERATURE	=	°F
ΔP	AVERAGE STACK VELOCITY HEAD	=	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	=	IN. H_2O
D	PROBE TIP DIAMETER	= 0.238	IN.

14.2
.074
568
994
1050 8

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	250	275	300	325	350
ΔPREF	0.85 ~~0.97~~		0.92 ~~0.93~~		0.97 ~~0.99~~

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	Val	☑ STABLE ☐ LEAKING	Val
STATIC	☑ STABLE ☐ LEAKING	Val	☑ STABLE ☐ LEAKING	Val

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.014 CFM @ 15" Hg	0.006 CFM @ 6" Hg
TIME (24 HOUR CLOCK)	0554	1500
BY	Val	Val

*Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-4
DATE 20 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Val
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AJ - 1	1230	276.557 ~~277.68~~	0.42	0.91	101	99	266	250		5.2	1
" 2	1232	278.83	0.44	0.95	104	100	275	250		5.0	
" 3	1234	279.93	0.43	0.87	106	101	283	~~295~~ 255	60	4.7	2
" 4	1236	~~280.92~~ 281.02	0.43	0.87	108	101	283	260	60	4.7	
" 5	1238	282.23	0.56	1.15	110	102	281	270	58	5.8	
AI - 1	1254	283.31	0.42	0.85	108	104	284	275		4.7	
" 2	1256	284.39	0.43	0.87	112	105	286	270		4.8	
" 3	1258	285.52	0.46	0.94	115	106	295	270	58	4.9	
" 4	1300	286.66	0.47	0.95	116	107	293	275	58	5.0	
" 5	1302	287.91	0.56	1.15	118	108	293	275	56	5.9	
AH - 1	1308	288.81	0.29	0.58	114	108	280	275		3.7	
" 2	1310	289.74	0.31	0.62	117	109	292	270		3.8	
" 3	1312	290.73	0.35	0.71	119	110	304	265	60	4.1	
" 4	1314	291.64	0.30	0.60	120	111	301	265	60	3.8	
" 5	1316	292.65	0.38	0.77	122	111	301	270	60	4.3	
AG - 1	1322	293.37	0.18	0.36	116	112	287	270		2.9	
" 2	1324	294.33	0.28	0.56	120	113	297	275		3.6	
" 3	1326	295.13	0.30	0.60	122	113	304	275	60	3.8	
" 4	1328	296.05	0.30	0.60	123	114	300	275	62	3.8	
" 5	1330	297.03	0.35	0.71	125	115	296	280	62	4.1	

COMMENTS: 1. NOMOGRAPH SET FOR 250°
2. " " " 300°
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

350/~~0.890~~ 0.85 300/~~0.93~~ 0.92 350/~~0.97~~ 0.97

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-4
DATE 20 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY VDL
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP IN (°F)	METER TEMP OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AF-1	1336	297.77	0.12	0.24	118	115	287	280		2.3	
" 2	1338	298.14	0.10	0.20	120	115	289	280		2.1	
" 3	1340	298.58	0.07	0.14	119	116	306	285	66	2.0	
" 4	1342	299.32	0.21	0.42	123	117	308	280	68	3.0	
" 5	1344	300.10	0.22	0.44	125	117	311	280	68	3.1	
AE-1	1350	300.59	0.05	0.11	118	117	233	280		<2	1
" 2	1352	300.84	0.04	0.08	120	118	284	285		<2	
" 3	1354	301.29	0.08	0.16	121	119	311	285	68	2.0	2
" 4	1356	301.99	0.18	0.36	125	119	324	285	70	2.9	
" 5	1358	302.72	0.19	0.38	126	120	324	285	68	3.1	
AD-1	1404	303.42	0.18	0.36	122	118	281	270		2.9	
" 2	1406	304.23	0.24	0.48	125	119	309	265		3.3	
" 3	1408	305.07	0.25	0.51	127	120	331	265	66	3.5	
" 4	1410	305.92	0.26	0.52	128	121	333	265	64	3.6	
" 5	1412	306.78	0.29	0.55	129	121	322	260	62	3.7	3
AC-1	1418	307.60	0.23	0.49	124	119	303	270		3.5	4
" 2	1420	308.53	0.33	0.66	128	120	307	270		4.1	5
" 3	1422	309.48	0.33	0.66	130	121	323	270	62	4.1	
" 4	1424	310.40	0.30	0.60	130	122	330	270	60	4.0	
" 5	1426	311.34	0.34	0.65	131	123	336	265	60	4.2	6

COMMENTS: 1. Nomograph set for 250°
2. " " " 300°
3. " " " 350°
4. " " " 250°
5. " " " 300°
6. " " " 350°
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.87 0.85 300/0.93 0.92 350/0.99 0.97

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-4
DATE 20 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Vol
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AB-1	1434	308.19	0.25	0.54	123	120	266	270		3.8	1
" 2	1436	313.22	0.45	0.90	129	121	801	270		5.1	2
" 3	1438	314.31	0.42	0.84	130	122	331	265	62	5.1	
" 4	1440	315.89	0.36	0.69	130	122	340	260	63	4.5	3
" 5	1442	316.35	0.43	0.82	131	122	332	260	62	5.0	
AA-1	1446	317.25	0.30	0.60	126	121	299	260		4.1	4
" 2	1448	318.28	0.39	0.78	129	121	317	265		5.0	
" 3	1450	319.26	0.35	0.67	129	122	337	265	62	4.8	5
" 4	1452	320.26	0.38	0.74	130	122	341	265	64	5.1	
" 5	1454	321.317	0.43	0.82	131	123	345	265	63	5.4	
											6

COMMENTS: 1. No nozzle set for 250°
2. " " " 300°
3. " " " 350°
4. " " " 300°
5. " " " 350°
6. Purged glassware @ 0.50 ΔH from 1505 to 1520
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

850/ 0.85 300/ 0.92 950/ 0.97

RUN NO. BEC-ESP-A-4

DATE 20 July 1980

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY val

ASSISTED BY JJB

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? _____

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE ~48 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1225	AE	1	13.5%	8.5%
1342	AE	2	12.0%	—
			12.75	8.5

CA RST

COMMENTS: _____

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY L.G&E.

RUN NUMBER BEC-ESP-A-5

FIELD DATES 7-17-80./7-26-80

SAMPLING LOCATION ESP-OUTLET-A

SAMPLING DATE 21 July 1980

FIELD CREW

PROJECT CHIEF	R.C. Tussey Jr.
TESTING ENGINEER	1 V. A. Lauritzen
	2
ENGR. TECHNICIAN	1 J. J. Bradley
	2
LAB TECHNICIAN	1
	2
OTHER	1
	2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-ESP-A-5 RECORDED BY: VGL

DATE: 21 July 1980 ASSISTED BY: JJB

AMBIENT TEMPERATURE: 90 °F

BAROMETER PRESSURE: 29.85 in. Hg.

READING TIME: 0805 RECORDED BY: VGL

BAROMETER I.D. 102 CALIBRATION DATE: 5-29-80

CORRECTED BAROMETER PRESSURE: (@ console location)

CONSOLE I.D.: D-494

IN TEMP. DIAL THERMOMETER I.D.: II

OUT TEMP. DIAL THERMOMETER I.D.: I

PROBE I.D. 205 LENGTH: 10 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: IX IMPACT: A side STATIC: B side

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-311

COLD BOX DIAL THERMOMETER I.D.: A - 1" DIAL

HOT BOX DIAL THERMOMETER I.D.: A - 2" DIAL

THERMOCOUPLE I.D.: 21 (Kenvirons Shield) LENGHT: 12 FT.

NOZZLE I.D.: 231 SIZE: 0.238

UMBILICAL I.D.: Silver LENGTH: 50 FT

COMMENTS:

RUN NO BEC-ESP-A-5
DATE 21 July 1980

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY Val
ASSISTED BY JJB

I. PROBE ASSEMBLY

A. PROBE LENGTH 10 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER IX
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.238 IN.
B. NOZZLE IDENT. NO. 231
C. UMBILICAL LENGTH 50 FT
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER 79168

III IMPINGER CONTENT

		NORMAL		USE		FINAL	NET
NUMBER	TYPE*	MATERIAL	AMOUNT	MATERIAL	AMOUNT gm	AMOUNT gm	GAIN
1	GS	DW	100ML	80% IPA	522.8 JJB	542.9 JJB	20.1
2	M	DW	100ML	12% H_2O_2	554.6 JJB	600.8 JJB	46.2
3	GS	DRY	———	12% H_2O_2	571.6 JJB	590.1 JJB	18.5
4	M	ADSORBENT**	~200GM.	~200 SG	658.8 JJB	676.5 JJB	17.7
#4 CONTAINER WEIGHT = ____ GM. WEIGHT WITH ADSORBENT = 658.8 GM.				TOTAL MOISTURE ADSORBED			102.5

Ck EST

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

IV CONTROL CONSOLE: $\Delta H@$ (PRE-TEST) 1.55 $\Delta H@$ (POST-TEST) ____
Y (PRE-TEST) 1.03 Y (POST-TEST) ____

CONSOLE NO. D-494

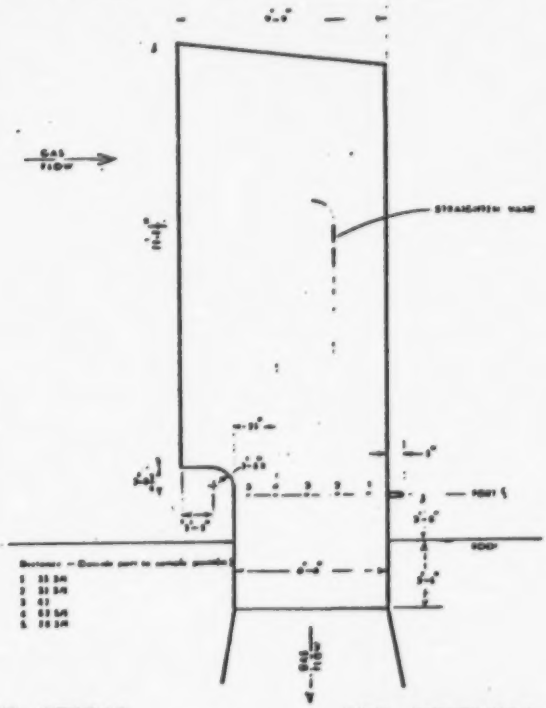
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☐ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☐ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-10 (0-5 IN. H_2O)) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☐ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☒ OTHER U-Tube Manometer

COMMENTS: ____

RUN NO. BEC-ESP-A-5 KENVIRONS, INC.

DATE 21 July 1980 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT _____ IN.

B. PORT LENGTH _____ IN.

STACK DIAMETER: (A-B) _____ IN.

STACK AREA: _____ IN.^{2}

FOR RECTANGULAR STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT 86 IN.

B. PORT LENGTH 8 IN.

STACK DEPTH: (A-B) 78 IN.

STACK WIDTH (INSIDE) 431 IN.

STACK AREA (DEPTH X WIDTH) 33618 IN.^{2}

EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$ _____ IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS	TYPE OF FLOW OBSTRUCTION	NUMBER OF SAMPLING POINTS
_____ DIAMETERS DOWNSTREAM OF	_____	MIN. REQ'D. (METHOD 1) _____
_____ DIAMETERS UPSTREAM OF	_____	USE 50

RUN NO. BEC-ESP-A-5 | KENVIRONS, INC. | RECORDED BY Val
DATE 21 July 1980 | NOMOGRAPH DATA | CHECKED BY _____

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	=	95	°F
	BAROMETRIC PRESSURE Pb = 29.88			
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb−0.05) =		29.83	IN. Hg.
ΔH @	REFERENCE ΔH	=	1.55	IN. H_2O
TM	AVG. METER TEMPERATURE	=	105	°F
% H_2O	MOISTURE CONTENT	=	9.5	% BY VOL.
Po	STATIC (GUAGE) PRESSURE IN STACK	=	−14.9	IN. H_2O
	x 0.074	=	−1.10	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	=	29.73	IN. Hg.
PM	METER PRESSURE (~Pb)	=	29.83	IN. Hg.
PS/PM	= _____			
C	CORRECTION FACTOR	=	0.81	
Ts	STACK TEMPERATURE	=		°F
ΔP	AVERAGE STACK VELOCITY HEAD	=		IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	=		IN. H_2O
D	PROBE TIP DIAMETER	=	0.238	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	250	275	300	325	350
ΔPREF	0.88		0.94 ~~0.93~~		1.00 ~~0.99~~

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	Val	☑ STABLE ☐ LEAKING	Val
STATIC	☑ STABLE ☐ LEAKING	Val	☑ STABLE ☐ LEAKING	Val

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.019 CFM @ 15" Hg	0.008 CFM @ 9" Hg
TIME (24 HOUR CLOCK)	0905	1300
BY	Val	Val

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-5
DATE 21 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Val
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AA - 1	1030	327.84/ 328.75	0.29	0.58	101	99	288	260		5.0	1
" 2	1032	329.80	0.41	0.82	103	100	310	265		5.7	
" 3	1034	330.80	0.37	0.68	106	101	333	275	62	5.0	2
" 4	1036	331.80	0.40	0.74	107	101	338	270	61	5.1	
" 5	1038	332.87	0.46	0.84	109	102	339	275	61	5.8	
AB - 1	1044	333.80	0.30	0.64	106	102	271	270		4.7	3
" 2	1046	334.86	0.46	0.91	110	103	305	270		6.0	4
" 3	1048	335.97	0.46	0.91	111	103	330	270	60	6.0	
" 4	1050	337.01	0.41	0.76	112	104	339	270	60	5.2	5
" 5	1052	338.09	0.47	0.88	113	104	336	270	58	6.0	
AC - 1	1056	338.91	0.25	0.49	108	104	275	270		4.0	6
" 2	1058	339.84	0.34	0.67	112	105	295	265		5.0	
" 3	1100	340.80	0.34	0.67	113	105	323	270	66	5.0	
" 4	1102	341.70	0.31	0.57	114	106	335	270	67	4.6	7
" 5	1104	342.63	0.35	0.64	115	106	342	270	67	5.0	
AD - 1	1110	343.37	0.20	0.40	109	106	295	270		3.8	8
" 2	1112	344.20	0.25	0.49	113	106	304	270		4.1	
" 3	1114	345.06	0.27	0.53	115	107	330	270	66	4.2	
" 4	1116	345.93	0.27	0.53	116	108	331	270	66	4.2	9
" 5	1118	346.82	0.31	0.57	117	108	325	270	64	4.8	

COMMENTS: 1. NOMOGRAPH SET FOR 300°
2. " " " 350°
3. " " " 250°
4. " " " 300°
5. " " " 350°
6. " " " 300°
7. " " " 350°
8. " " " 300°
9. NOMOGRAPH SET FOR 350°
10.
11.
12.
13.
14.
15.
16.

250/ 0.88 300/ 0.94 350/ 1.00

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-5
DATE 21 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY Vol
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AE-1	1124	347.78	0.05	0.10	109	108	270	275		2.0	1
" 2	1126	347.59	0.06	0.13	110	108	276	270		2.1	
" 3	1128	348.12	0.10	0.20	112	109	313	270	72	2.8	2
" 4	1130	348.86	0.20	0.40	115	109	324	270	74	3.8	
" 5	1132	349.41	0.22	0.40	116	109	327	275	68	3.8	3
AF-1	1136	350.24	0.14	0.28	112	109	293	270		3.1	4
" 2	1138	350.87	0.14	0.28	114	110	311	270		3.1	
" 3	1140	351.38	0.09	0.18	114	110	320	270	74	2.7	
" 4	1142	352.16	0.24	0.47	117	110	319	270	68	4.1	
" 5	1144	353.01	0.27	0.53	118	110	321	270	66	4.5	
AG-1	1149	353.75	0.20	0.40	113	110	284	270		3.9	
" 2	1151	354.63	0.29	0.57	117	110	310	270		4.8	
" 3	1153	355.57	0.32	0.68	118	110	313	265	60	5.1	
" 4	1155	356.50	0.32	0.63	118	111	310	265	61	5.1	
" 5	1157	357.43	0.32	0.63	118	110	307	270	60	5.1	
AH-1	1202	358.34	0.30	0.59	114	109	291	250		5.0	
" 2	1204	359.28	0.33	0.65	117	109	322	245		5.2	
" 3	1206	360.29	0.38	0.75	118	110	306	260	60	6.0	
" 4	1208	361.25	0.33	0.65	118	110	305	275	58	5.5	
" 5	1210	362.29	0.43	0.85	119	110	303	275	60	6.8	

COMMENTS: 1. NOMOGRAPH SET FOR 250°
2. " " " 300°
3. " " " 350°
4. " " " 300°
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.88 300/0.94 350/1.00

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-ESP-A-5
DATE 21 July 1980
SAMPLING TIME PER POINT 2 MIN.

RECORDED BY val
ASSISTED BY JJB

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP IN (°F)	METER TEMP OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
AF 36 -1	1216	363.37	0.44	0.87	114	109	282	250		6.5	
" 2	1218	364.48	0.46	0.90	118	109	301	240		6.8	
" 3	1220	365.62	0.47	0.92	119	110	303	240	62	7.0	
" 4	1222	366.75	0.48	0.95	120	111	301	250	61	7.2	
" 5	1224	367.95	0.56	1.10	121	111	298	250	62	8.0	
AF 37 -1	1235	369.05	0.46	0.90	115	110	291	250		6.9	
" 2	1237	370.21	0.51	1.00	119	111	301	250		7.5	
" 3	1239	371.78	0.50	0.99	120	112	309	250	64	7.5	
" 4	1241	372.55	0.50	0.99	122	113	306	255	62	7.6	
" 5	1243	373.796	0.58	1.15	123	113	303	260	62	8.7	1

COMMENTS: 1. forced glassware @ 0.50" Δ H from 1301 to 1310
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

250/0.88 300/0.94 350/1.00

RUN NO. BEC-ESP-A-5

DATE 21 July 1980

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY TRL

ASSISTED BY JJB

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? _____

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE ~48 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1217	AE	1	13.0	8.0
1244	AD	2	12.5	7.5

12.75

7.75

CARST

COMMENTS: _____

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY L.G&E.

RUN NUMBER BEC-ESP-A-6

FIELD DATES 7-17-80/7-26-80

SAMPLING LOCATION ESP-OUTLET-A

SAMPLING DATE 22 July 1980

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 V.A. Lauritzen
2

ENGR. TECHNICIAN 1 J.J. Berley
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-ESP-A-6 RECORDED BY: VAL

DATE: 22 July 1980 ASSISTED BY:

AMBIENT TEMPERATURE: 80 °F

BAROMETER PRESSURE: 29.79 in. Hg.

READING TIME: 0900 RECORDED BY: VAL

BAROMETER I.D. 102 CALIBRATION DATE: 5-29-80

CORRECTED BAROMETER PRESSURE: (@ console location)

CONSOLE I.D.: D-494

IN TEMP. DIAL THERMOMETER I.D.: II

OUT TEMP. DIAL THERMOMETER I.D.: II

PROBE I.D. 205 LENGTH: 10 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: TX IMPACT: A side STATIC: B side

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-311

COLD BOX DIAL THERMOMETER I.D.: A - 1" DIAL

HOT BOX DIAL THERMOMETER I.D.: A - 2" DIAL

THERMOCOUPLE I.D.: 21 (Kenvirons Shield) LENGHT: 12 FT.

NOZZLE I.D.: 231 SIZE: 0.238

UMBILICAL I.D.: Silver LENGTH: 50 FT

COMMENTS:

RUN NO. BEC-STK-6 | KENVIRONS, INC. | RECORDED BY GHR
DATE 7/22/86 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 85	°F
	BAROMETRIC PRESSURE Pb = 29.74		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − 0.22) =	29.57	IN. Hg.
ΔH @	REFERENCE ΔH	= 1.60	IN. H_2O
TM	AVG. METER TEMPERATURE	= 105	°F
% H_2O	MOISTURE CONTENT	= 15	% BY V
Po	STATIC (GUAGE) PRESSURE IN STACK	= −0.75	IN. H_2O
	x 0.074	= −0.06	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 29.51	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.57	IN. Hg.
PS/PM	= _____		
C	CORRECTION FACTOR	= 0.785	
Ts	STACK TEMPERATURE	= 175	°F
ΔP	AVERAGE STACK VELOCITY HEAD	= _____	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	= _____	IN. H_2O
D	PROBE TIP DIAMETER	= ~~0.24~~ 0.172	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	100	125	150	175	
ΔPREF				3.0	

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	GHR + PM	☑ STABLE ☐ LEAKING	GHR + PM
STATIC	☑ STABLE ☐ LEAKING	GHR + PM	☑ STABLE ☐ LEAKING	GHR + PM

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.012 cfm @ 15" Hg	0.007 cfm @ 6" Hg
TIME (24 HOUR CLOCK)	10:12 thru Hp	12:23 thru Hp
BY	GHR + PM	GHR + PM

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STK-6
DATE 7/22/86
SAMPLING TIME PER POINT 3 MIN.

RECORDED BY E.H.R.
ASSISTED BY P.M.

PORT POINT	CLOCK TIME start/stop	METER VOLUME (DCF)	ΔP VEL. HEAD (IN. H_2O)	ΔH ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg.)	COMMENT NUMBER
A-1	10:35	631.74 / 32.41	0.56	0.30	87	84	177	230	68	3.8	
" 2		33.56	0.65	0.39	100	85	183	225	64	4.0	1
" 3		34.75	0.85	0.52	105	85	183	225	64	5.0	1
" 4		36.04	0.85	0.52	107	85	186	225	65	5.0	1
" 5		37.23	0.80	0.48	110	86	184	225	64	5.0	
" 6		38.46	0.80	0.48	112	87	181	235	64	5.0	
A " 7	10:56	639.76	0.80	0.48	114	88	178	240	64	5.0	
D-1	10:59	640.72	0.55	0.33	107	90	179	260	68	3.8	
" 2		41.82	0.65	0.39	113	90	179	258	64	4.0	2
" 3		43.04	0.80	0.48	116	91	174	235	62	4.8	2
" 4		44.31	0.85	0.52	118	92	177	220	60	5.0	
" 5		45.52	0.80	0.48	118	92	174	200	61	4.8	
" 6		46.77	0.80	0.48	120	93	172	220	61	4.8	
D " 7	11:20	648.01	0.80	0.48	120	93	172	220	61	4.8	
C-1	11:28	648.93	0.45	0.27	111	95	169	230	68	3.4	
" 2		650.00	0.60	0.36	117	95	171	235	62	4.0	
" 3		51.13	0.70	0.42	118	95	173	240	62	4.3	3
" 4		52.33	0.75	0.45	120	95	172	240	62	4.8	3
" 5		53.56	0.80	0.48	121	95	171	240	62	5.0	
" 6		54.80	0.80	0.48	121	95	174	250	62	5.0	
C " 7	11:49	656.05	0.75	0.45	121	95	174	250	62	4.9	

COMMENTS: 1. Angle is vertical @ 45
2. Angle is vertical @ 5.0°
3. Angle is vertical @ 5.0°
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STA-6
DATE 7/22/80
SAMPLING TIME PER POINT 3 MIN.

RECORDED BY CHL
ASSISTED BY PM

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP (°F)	BOX TEMP (°F)	BATH TEMP (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
	starting										
B-1	11:55	56.44	0.45	0.27	108	95	169	270	68	3.5	
" 2		58.05	0.65	0.39	118	95	177	270	63	4.2	
" 3		59.25	0.75	0.45	120	95	175	275	60	4.8	1
" 4		60.47	0.80	0.48	121	95	175	270	60	5.0	1
" 5		61.77	0.85	0.54	122	95	176	275	60	5.1	
" 6		63.02	0.80	0.48	122	95	176	290	60	5.0	
B " 7	12:16	64.263	0.80	0.48	122	95	175	295	62	5.0	
Average			.7504	.4396	114.667	103.21 91.82					

COMMENTS: 1. Angle is vertical @ 5.0°

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12. purged 12:30 - 12:45

13. @ ΔH = 0.45

14.

15.

16.

KENVIRONS, INC.

RUN NO. BRC-STK-6 | CARRIER GAS | RECORDED BY GR

DATE 7-22-80 | SAMPLING (ORSAT) | ASSISTED BY

NOTE: SAME AS RUN _____

A. GRAB SAMPLE (EVACUATED BULB)

SAMPLING TRAIN DESCRIPTION:

BULB MATERIAL AND VOLUME _____ ML.

PROBE MATERIAL AND LENGTH _____ IN.

PREFILTER MATERIAL _____

SAMPLING LOCATION: PORT _____ POINT _____

BULB NUMBER	INITIAL BULB VACUUM (IN. Hg)	VACUUM MEASUREMENT TIME (MIN.)	CLOCK TIME (24 HR. CLOCK)

B. INTEGRATED SAMPLE (TEDLAR BAG-TRAIN)

SAMPLING TRAIN DESCRIPTION:

PROBE MATERIAL AND LENGTH stainless steel 8 ft. IN.

PREFILTER MATERIAL none

PUMP TYPE diaphram COOLING COIL stainless steel ice b

SAMPLING LOCATION: PORT A11 POINT 2-7

SAMPLING TIME: START Same as method STOP _____

INTEGRATED SAMPLE TRAIN LEAK CHECKS*					
PRE-TEST	TIME	BY	POST-TEST	TIME	BY
☑ STABLE ☐ LEAKING	10:00	pm	☑ STABLE ☐ LEAKING	12:20	pm

* Vacuum must remain stable for 30 seconds @ 10 in. Hg.

BAG LEAK CHECK PERFORMED BY RST . TIME overnight 7/21/80 - 7/22/.

COMMENTS: _____

KENVIRONS, INC.
DRÄGER DATA FORM

RUN NO. BEC-STK-6 TYPE OF DRÄGER ____ RECORDED BY GPR

DATE 7/22/80 ASSISTED BY ____

DISTANCE FROM DUCT INSIDE WALL TO DRÄGER SAMPLE TUBE TIP - 12 IN.

DISTANCE FROM DUCT INSIDE WALL TO METHOD 6 OR 8 PROBE TIP - — IN.

SAMPLE PORT DESIGNATION C

ARE BOTH SAMPLES TAKEN FROM SAME PORT? — YES ____ NO

IF NO, APPROXIMATE DISTANCE FROM PROBE TIP TO SAMPLE TIP — IN.

WAS DRÄGER SAMPLE TUBE PURGED? ✓ YES ____ NO

IF NO, GIVE REASON FOR NOT PURGING TUBE ____

RUN NO.	TIME	N NO. OF PUMPS FOR SAMPLE	R DRÄGER TUBE READING	R X 10 / N IN PPM
STK6-A	12:45	10	225	225
STK6-B	12:48	10	205	205
STK6-C	12:51	10	205	205
STK6-D	12:55	10	190	190

COMMENTS: ____

RUN NO. BEC-STK-6

DATE 7/22/80

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY PHM

ASSISTED BY _____

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? _____

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE 12 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1245	A	1	10%	10½%

COMMENTS: _____

RUN NO. BEC-STK-6
DATE 7-22-80

KENVIRONS, INC.
CARRIER GAS
ANALYSIS (ORSAT)

ANALYZED BY PR

ORSAT LEAK CHECKS									
PRE-ANALYSIS					POST-ANALYSIS				
NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY	NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY
1	1530 / 1535	32.9 / 32.9	X	PR	1	1605 / 1610	42.0 / 42.0	✓	PR
2					2				
3					3				
4					4				

SAMPLE IDENTIFICATION	CO_2 READING 1	READING 2	O_2 (2-1)	READING 3	CO (3-2)
#6 Stack	11.0	18.8	7.8	18.8	0
	11.1	18.8	7.7	18.8	0
Run 6	11.1	18.8	7.7	18.8	0
	AVG = 11.07		AVG = 7.73		AVG = -0-
	AVG =		AVG =		AVG =
	AVG =		AVG =		AVG =
	AVG =		AVG =		AVG =

CK / RS

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY LG&E Cane Run 6 Stack

RUN NUMBER BEC-STK-7

FIELD DATES 7-17-80 / 7-26-80

SAMPLING LOCATION CR6 Stack

SAMPLING DATE 7/23/80

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 Gary H. Rewkett
2

ENGR. TECHNICIAN 1 Parker H. Moore
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-STK-7 RECORDED BY: RCT
DATE: 7-28-80 ASSISTED BY:

AMBIENT TEMPERATURE: 97 °F
BAROMETER PRESSURE: 29.80 in. Hg.
READING TIME: 7:41 AM RECORDED BY: RCT
BAROMETER I.D. 182 CALIBRATION DATE: 5-29-80
CORRECTED BAROMETER PRESSURE: (@ console location)
CONSOLE I.D.: D-328
IN TEMP. DIAL THERMOMETER I.D.: II
OUT TEMP. DIAL THERMOMETER I.D.: I
PROBE I.D. 307 LENGTH: 8 FT.
PROBE EXTENSION I.D. — LENGTH: —
PITOT I.D.: VII IMPACT: side B STATIC: side A
PITOT EXTENSION I.D.: — LENGTH: —
SAMPLE BOX I.D.: S-3112
COLD BOX DIAL THERMOMETER I.D.: C - 1" Dial
HOT BOX DIAL THERMOMETER I.D.: C - 2" Dial
THERMOCOUPLE I.D.: 28 (Kenvirons Shield) LENGHT: 9 FT.
NOZZLE I.D.: 435 SIZE: 0.241
UMBILICAL I.D.: Green LENGTH: 75 FT.

COMMENTS:

RUN NO BEC-STK-7
DATE 7-23-80

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY GR
ASSISTED BY PM

I. PROBE ASSEMBLY
A. PROBE LENGTH 8 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER VII
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS
A. NOZZLE DIAMETER ~~0.241~~ 0.172 IN
B. NOZZLE IDENT. NO. 435
C. UMBILICAL LENGTH 75 F
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER 79173

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE MATERIAL	USE AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	519.5g	549.1	29.6
2	M	DW	100ML	3% H_2O_2	539.6g	579.2g	39.6
3	GS	DRY	———	3% H_2O_2	522.3g	535.7g	13.4
4	M	ADSORBENT**	~200GM.		678.9g	689.5g	10.6
#4 CONTAINER WEIGHT = ____ GM.				TOTAL MOISTURE ADSORBED			93.2
WEIGHT WITH ADSORBENT = ____ GM.							

CK RST RST

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

IV CONTROL CONSOLE: $\Delta H@$ (PRE-TEST) 1.67 $\Delta H@$ (POST-TEST) ____
Y (PRE-TEST) 1.02 Y (POST-TEST) ____

CONSOLE NO. D-328

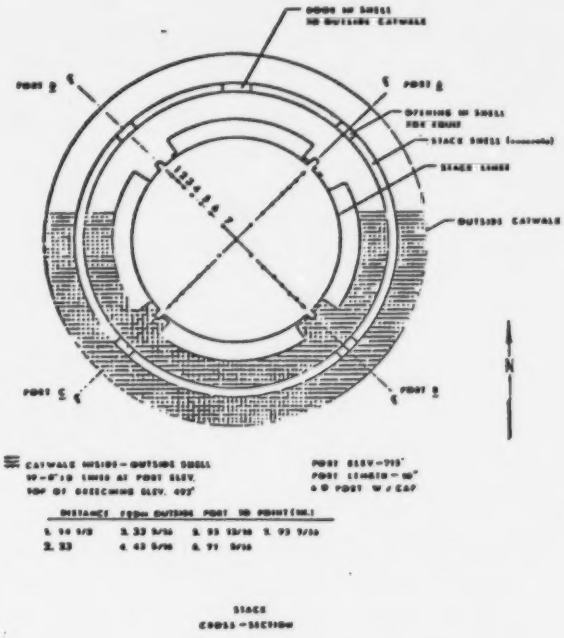
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☐ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☒ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☐ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENITIVITY (RANGE ____) ☐ OTHER U-Tube Manometer

COMMENTS: ____

RUN NO. BEC-STK-7 KENVIRONS, INC.

DATE 7-22-80 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS		FOR RECTANGULAR STACKS	
A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT	238 IN.	A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT	_____ IN.
B. PORT LENGTH	10 IN.	B. PORT LENGTH	_____ IN.
STACK DIAMETER: (A-B)	228 IN.	STACK DEPTH: (A-B)	_____ IN.
STACK AREA:	40828.1 IN.^{2}	STACK WIDTH (INSIDE)	_____ IN.
		STACK AREA (DEPTH X WIDTH)	_____ IN.^{2}
		EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$	_____ IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS		TYPE OF FLOW OBSTRUCTION
11	DIAMETERS DOWNSTREAM OF	Breeching
13	DIAMETERS UPSTREAM OF	top of stack

NUMBER OF SAMPLING POINTS	
MIN. REQ'D. (METHOD 1)	12
USE	28

RUN NO. BEC-STK-7 | KENVIRONS, INC. | RECORDED BY GAR
DATE 7/21/80 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 87	°F
	BAROMETRIC PRESSURE Pb = 29.80		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − .022) =	29.58 ~~29.55~~	IN. Hg.
ΔH @	REFERENCE ΔH	= 1.68	IN. H_2O
TM	AVG. METER TEMPERATURE	= 107	°F
% H_2O	MOISTURE CONTENT	= 15	% BY VOL
Po	STATIC (GUAGE) PRESSURE IN STACK	= −0.75	IN. H_2O
	x 0.074	= 0.06	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 29.52 ~~29.74~~	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.56	IN. Hg.
PS/PM	=		
C	CORRECTION FACTOR	=	
TS	STACK TEMPERATURE	= 175	°F
ΔP	AVERAGE STACK VELOCITY HEAD	=	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	=	IN. H_2O
D	PROBE TIP DIAMETER	= ~~0.234~~ 0.177	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	100	125	150	175	
ΔPREF					

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☑ STABLE ☐ LEAKING	GHR + PM	☑ STABLE ☐ LEAKING	GHR + PM
STATIC	☑ STABLE ☐ LEAKING	GHR + PM	☑ STABLE ☐ LEAKING	GHR + PM

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.007 cfm @ 15" Hg	0.002 cfm @ 5.8" Hg
TIME (24 HOUR CLOCK)	10:33 thru tip	18:20 thru tip
BY	GHR + PM	GHR + PM

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.

PARTICULATE

SAMPLING

RUN NO. BEC-STK-7

DATE 7/23/80

SAMPLING TIME PER POINT 3 MIN.

RECORDED BY [illegible]

ASSISTED BY [illegible]

PORT POINT	CLOCK TIME start/stop	METER VOLUME (DCF)	ΔP VEL. HEAD (IN. H_2O)	ΔH ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
D - 1	16:20	670.276 / 70.91	0.25	0.145	92	87	171	276	75	2.4	
" 2		71.85	0.55	0.32	98	87	178	270	74	3.2	
" 3		72.90	0.60	0.35	100	87	182	270	72	3.5	
" 4		74.00	0.65	0.38	102	87	177	270	71	3.5	
" 5		75.10	0.65	0.38	100	87	171	275	72	3.6	
" 6		76.21	0.65	0.38	101	88	161	275	72	3.7	
D " 7	16:41	677.32	0.65	0.38	102	88	160	280	73	3.8	
A - 1	16:47	678.11	0.40	0.23	96	91	148	290	65	2.0	
" 2		79.12	0.60	0.35	108	90	171	290	67	3.2	
" 3		80.18	0.65	0.38	112	91	170	270	68	3.3	
" 4		81.29	0.70	0.41	116	91	166	265	69	3.5	
" 5		82.46	0.75	0.44	118	92	171	265	62	3.8	
" 6		83.65	0.80	0.47	119	92	169	270	61	4.0	
A " 7	17:08	684.85	0.80	0.47	120	93	176	275	60	4.0	
C - 1	17:20	685.74	0.45	0.26	108	96	173	275	69	3.0	
" 2		86.66	0.50	0.29	115	95	178	260	69	3.1	
" 3		87.69	0.60	0.35	117	95	181	250	69	3.3	
" 4		88.78	0.65	0.38	120	95	177	245	72	3.5	
" 5		89.87	0.65	0.38	120	95	176	260	70	3.5	
" 6		90.97	0.65	0.38	121	95	170	280	68	3.5	
C " 7	17:41	692.06	0.65	0.38	121	95	172	310	62	3.5	

COMMENTS: 1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

16.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STA-7
DATE 7-23-80
SAMPLING TIME PER POINT 3 MIN.

RECORDED BY CH
ASSISTED BY PA

PORT POINT	CLOCK TIME start/stop	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
B-1	17:53	692.90	0.40	0.23	110	96	166	230	67	3.0	
" 2		93.84	0.55	0.32	116	96	164	225	66	3.2	
" 3		95.00	0.72	0.41	118	96	174	230	63	3.8	
" 4		96.14	0.70	0.41	120	96	173	225	64	3.8	
" 5		97.32	0.75	0.44	121	96	168	235	68	3.9	
" 6		98.56	0.75	0.44	122	96	164	245	68	4.0	
B " 7	18:14	699.707	0.75	0.44	122	96	168	245	68	4.8	

COMMENTS: 1.
2.
3.
4.
5.
6.
7.
8.
9. purged 18:30 - 18:45
10. @ ΔH = 0.35
11.
12.
13.
14.
15.
16.

KENVIRONS, INC.

RUN NO. BEC-STK-7 | CARRIER GAS | RECORDED BY GTR

DATE 7-23-80 | SAMPLING (ORSAT) | ASSISTED BY PM

NOTE: SAME AS RUN _____

A. GRAB SAMPLE (EVACUATED BULB)

SAMPLING TRAIN DESCRIPTION:

BULB MATERIAL AND VOLUME _____ ML.

PROBE MATERIAL AND LENGTH _____ IN.

PREFILTER MATERIAL _____

SAMPLING LOCATION: PORT _____ POINT _____

BULB NUMBER	INITIAL BULB VACUUM (IN. Hg)	VACUUM MEASUREMENT TIME (MIN.)	CLOCK TIME (24 HR. CLOCK)

B. INTEGRATED SAMPLE (TEDLAR BAG-TRAIN)

SAMPLING TRAIN DESCRIPTION:

PROBE MATERIAL AND LENGTH stainless steel 8 ft. IN.

PREFILTER MATERIAL none

PUMP TYPE diaphram COOLING COIL stainless steel coil

SAMPLING LOCATION: PORT All POINT 2-7

SAMPLING TIME: START Same as bulbed STOP —

INTEGRATED SAMPLE TRAIN LEAK CHECKS*					
PRE-TEST	TIME	BY	POST-TEST	TIME	BY
☒ STABLE ☐ LEAKING	1:05	PM	☒ STABLE ☐ LEAKING	1820	PM

*Vacuum must remain stable for 30 seconds @ 10 in. Hg.

BAG LEAK CHECK PERFORMED BY RST . TIME overnight 7/22/80 - 7/23/80

COMMENTS: _____

KENVIRONS, INC.
DRÄGER DATA FORM

RUN NO. BEC-STK-7 TYPE OF DRÄGER ____ RECORDED BY GR
DATE 7-20-80 ASSISTED BY ____

DISTANCE FROM DUCT INSIDE WALL TO DRÄGER SAMPLE TUBE TIP - ~12 IN.
DISTANCE FROM DUCT INSIDE WALL TO METHOD 6 OR 8 PROBE TIP - — IN.
SAMPLE PORT DESIGNATION C
ARE BOTH SAMPLES TAKEN FROM SAME PORT? ✓ YES ____ NO

IF NO, APPROXIMATE DISTANCE FROM PROBE TIP TO SAMPLE TIP — IN.
WAS DRÄGER SAMPLE TUBE PURGED? ✓ YES ____ NO
IF NO, GIVE REASON FOR NOT PURGING TUBE ____

RUN NO.	TIME	N NO. OF PUMPS FOR SAMPLE	R DRÄGER TUBE READING	R X 10 / N IN PPM	
STK-7A	18:40	10	160	160	
STK-7B	18:45	10	150	150	
cal-A	18:50	10	90	90	101 ppm SO_2 tank
Cal-B	18:55	10	120	120	

COMMENTS: ____

RUN NO. BEC-STK-7

DATE 7/23/80

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY DAM

ASSISTED BY _____

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? _____

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE 12 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1830		1	11%	10½%

COMMENTS: _____

RUN NO. DEC-STK-7
DATE 7-23-80

KENVIRONS, INC.
CARRIER GAS
ANALYSIS (ORSAT)

ANALYZED BY PFR

ORSAT LEAK CHECKS									
PRE-ANALYSIS					POST-ANALYSIS				
NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY	NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY
1	1925 / 1930	17.3 / 17.3	✓	PR	1	2025 / 2030	35.6 / 35.6	✓	PR
2					2				
3					3				
4					4				

SAMPLE IDENTIFICATION	CO_2 READING 1	READING 2	O_2 (2-1)	READING 3	CO (3-2)
Stack #6	10.5	18.3	7.8	18.5	0.2
	10.5	18.4	7.9	18.5	0.1
	10.5	18.4	7.9	18.5	0.1
	AVG = 10.5		AVG = 7.867		AVG = 0.13
Stack #6	10.5	18.4	7.9	18.5	0.1
	10.6	18.4	7.8	18.5	0.1
	10.6	18.4	7.8	18.5	0.1
	AVG = 10.567		AVG = 7.833		AVG = 0.1
Ave.	10.53		7.95		0.12 CR/RST
	AVG =		AVG =		AVG =
	AVG =		AVG =		AVG =

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY LGTE Cane Run #6

RUN NUMBER BEC-STK-8

FIELD DATES 7-17-80/7-26-80

SAMPLING LOCATION Stack

SAMPLING DATE 7/24/80

FIELD CREW

PROJECT CHIEF		R.C. Tussey Jr.
TESTING ENGINEER	1	Gary H. Redett
	2	
ENGR. TECHNICIAN	1	Parker Moore
	2	
LAB TECHNICIAN	1	
	2	
OTHER	1	
	2	

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-STK-4 RECORDED BY: Gltz
DATE: 7/24/80 ASSISTED BY:

AMBIENT TEMPERATURE: 80 °F
BAROMETER PRESSURE: 29.82 in. Hg.
READING TIME: 7.55 RECORDED BY: RST
BAROMETER I.D. 102 CALIBRATION DATE: 5/29/80
CORRECTED BAROMETER PRESSURE: (@ console location)
CONSOLE I.D.: D-328
IN TEMP. DIAL THERMOMETER I.D.: II
OUT TEMP. DIAL THERMOMETER I.D.: I
PROBE I.D. 307 LENGTH: 8 FT.
PROBE EXTENSION I.D. — LENGTH: —
PITOT I.D.: VII IMPACT: side B STATIC: side A
PITOT EXTENSION I.D.: — LENGTH: —
SAMPLE BOX I.D.: S-3112
COLD BOX DIAL THERMOMETER I.D.: C - 1" Dial
HOT BOX DIAL THERMOMETER I.D.: C - 2" Dial
THERMOCOUPLE I.D.: 28 (Kenvirons Shield) LENGHT: 9 FT.
NOZZLE I.D.: 435 SIZE: 0.241
UMBILICAL I.D.: Green LENGTH: 75 FT.

COMMENTS:

RUN NO BEC-STK-8
DATE 7-24-80

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY GR
ASSISTED BY

I. PROBE ASSEMBLY
- A. PROBE LENGTH 8 FT.
- B. LINER MATERIAL stainless steel
- C. PITOT NUMBER VII
- D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS
- A. NOZZLE DIAMETER 0.172 ~~0.251~~ IN
- B. NOZZLE IDENT. NO. 435
- C. UMBILICAL LENGTH 75 F
- D. FILTER HOLDER TYPE 4" LSI
- E. FILTER NUMBER 79177

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE MATERIAL	USE AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	520.8g	559.2g	38.4
2	M	DW	100ML	3% H_2O_2	541.7g	587.1g	45.4
3	GS	DRY	———	3% H_2O_2	524.6gs	537.9g	13.3
4	M	ADSORBENT**	~200GM.		692.6gs	704.6g	12.0
#4 CONTAINER WEIGHT = ____ GM.				TOTAL MOISTURE ADSORBED			109.1
WEIGHT WITH ADSORBENT = ____ GM.							

CW/RST

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

IV CONTROL CONSOLE: Δ H@ (PRE-TEST) 1.67 Δ H@ (POST-TEST) ____
Y (PRE-TEST) 1.02 Y (POST-TEST) ____

CONSOLE NO. D-328

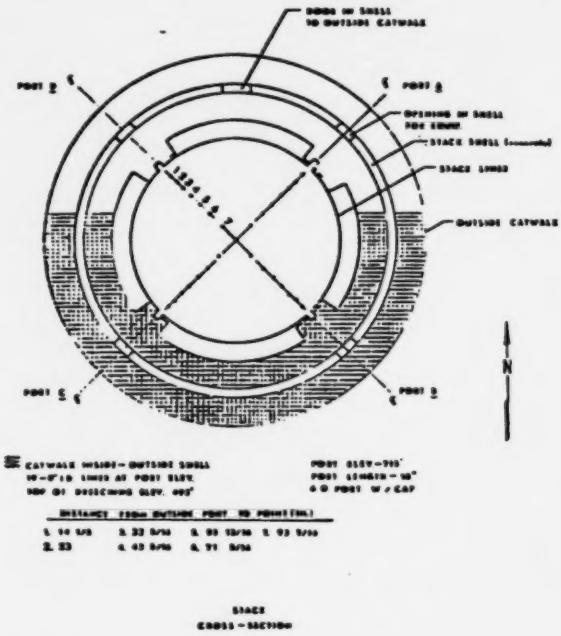
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☐ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☒ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☐ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER U-Tube manometer

COMMENTS: ____

RUN NO. BEC-STK-8 KENVIRONS, INC.

DATE 2-24-80 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



STACK CROSS-SECTION

FOR ROUND STACKS		FOR RECTANGULAR STACKS	
A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT	238 IN	A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT	IN.
B. PORT LENGTH	10 IN	B. PORT LENGTH	IN.
STACK DIAMETER: (A-B)	228 IN	STACK DEPTH: (A-B)	IN.
STACK AREA:	40828.1 IN^2	STACK WIDTH (INSIDE)	IN.
		STACK AREA (DEPTH X WIDTH)	IN.^{2}
		EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$	IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS		TYPE OF FLOW OBSTRUCTION
11	DIAMETERS DOWNSTREAM OF	Breaching
13	DIAMETERS UPSTREAM OF	top of stack

NUMBER OF SAMPLING POINTS

MIN. REQ'D. (METHOD 1) 12

USE 28

RUN NO. BEC-STK-8 | KENVIRONS, INC. | RECORDED BY GHR
DATE 7/24/80 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 80	°F
	BAROMETRIC PRESSURE Pb = 29.82		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.)=(Pb−0.22)=	29.60	IN. Hg.
ΔH @	REFERENCE ΔH	= 1.67	IN. H_2O
TM	AVG. METER TEMPERATURE	= 100	°F
% H_2O	MOISTURE CONTENT	= 15	% BY VOL
Po	STATIC (GUAGE) PRESSURE IN STACK	= −0.60	IN. H_2O
	x 0.074	= 0.05	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 29.55	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.60	IN. Hg.
PS/PM	=		
C	CORRECTION FACTOR	= 0.77	
Ts	STACK TEMPERATURE	= 175	°F
ΔP	AVERAGE STACK VELOCITY HEAD	=	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	=	IN. H_2O
D	PROBE TIP DIAMETER	= 0.244/0.172	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

Ts	100	125	150	175	
ΔPREF				3.2	

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☒ STABLE ☐ LEAKING	GHR/PM	☒ STABLE ☐ LEAKING	GHR/PM
STATIC	☒ STABLE ☐ LEAKING	GHR/PM	☒ STABLE ☐ LEAKING	GHR/PM

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.007 cfm @ 15" Hg	0.002 cfm @ 5" Hg
TIME (24 HOUR CLOCK)	10:50 hour	12:54 hour
BY	GHR + PM	GHR + PM

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.

RUN NO. BEC-STK-8 PARTICULATE RECORDED BY GHR

DATE 7/24/82 SAMPLING ASSISTED BY PL

SAMPLING TIME PER POINT 3 MIN.

PORT POINT	CLOCK TIME start/stop	METER VOLUME (DCF)	ΔP VEL. HEAD (IN. H_2O)	ΔH ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
A-1	11:00	707.52 / 08.41	0.45	0.26	92	84	162	275	68	3.4	
" 2		09.44	0.60	0.35	100	84	167	270	64	3.5	
" 3		10.55	0.70	0.41	105	84	168	265	62	3.9	
" 4		11.71	0.75	0.44	107	84	169	265	60	4.0	
" 5		12.88	0.75	0.44	109	84	169	260	59	4.1	
" 6		14.04	0.75	0.44	110	85	168	260	59	4.1	
A " 7	11:21	715.20	0.75	0.44	111	85	168	265	62	4.1	
B-1	11:28	716.09	0.45	0.26	105	88	163	275	68	3.1	
" 2		17.12	0.60	0.35	110	88	169	270	66	3.7	
" 3		18.23	0.70	0.41	112	88	168	265	64	4.0	
" 4		19.40	0.75	0.44	113	88	167	270	68	4.2	
" 5		20.57	0.75	0.44	115	88	166	275	68	4.1	
" 6		21.74	0.75	0.44	115	89	166	280	66	4.2	
D " 7	11:49	722.91	0.75	0.44	116	89	165	285	63	4.2	
C-1	11:55	723.79	0.45	0.26	105	91	167	285	68	3.2	
" 2		24.83	0.60	0.35	112	90	171	285	68	3.8	
" 3		25.97	0.70	0.41	115	90	174	280	75	4.0	
" 4		27.14	0.75	0.44	116	90	170	280	74	4.3	
" 5		28.33	0.75	0.44	116	90	169	275	78	4.3	
" 6		29.51	0.75	0.44	117	90	166	280	70	4.3	
C " 7	12:16	730.70	0.75	0.44	118	90	167	280	67	4.3	

COMMENTS: 1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

16.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STK-8
DATE 7/24/80
SAMPLING TIME PER POINT 3 MIN.

RECORDED BY Cfr
ASSISTED BY Pm

PORT POINT	CLOCK TIME Start/Stop	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
B-1	12:23	731.252	0.45	0.26	109	93	163	270	71	3.2	
" 2		32.65	0.60	0.35	114	92	170	285	71	3.8	
" 3		33.79	0.70	0.41	116	92	170	282	69	4.0	
" 4		34.94	0.75	0.44	118	92	170	265	68	4.1	
" 5		36.12	0.75	0.44	118	92	169	270	68	4.2	
" 6		37.31	0.75	0.44	118	92	169	280	70	4.3	
B " 7	12:44	738.999	0.75	0.44	118	92	168	280	68	4.4	
			.6786	.3971	100.25		167.8				

COMMENTS: 1.
2.
3.
4.
5.
6.
7.
8.
9. purged
10. @ 0.40 Δh
11.
12.
13.
14.
15.
16.

KENVIRONS, INC.

RUN NO. BEC-STK-9 | CARRIER GAS | RECORDED BY GR

DATE 7-24-80 | SAMPLING (ORSAT) | ASSISTED BY

NOTE: SAME AS RUN _____

A. GRAB SAMPLE (EVACUATED BULB)

SAMPLING TRAIN DESCRIPTION:

BULB MATERIAL AND VOLUME _____ ML.

PROBE MATERIAL AND LENGTH _____ IN.

PREFILTER MATERIAL _____

SAMPLING LOCATION: PORT _____ POINT _____

BULB NUMBER	INITIAL BULB VACUUM (IN. Hg)	VACUUM MEASUREMENT TIME (MIN.)	CLOCK TIME (24 HR. CLOCK)

B. INTEGRATED SAMPLE (TEDLAR BAG-TRAIN)

SAMPLING TRAIN DESCRIPTION:

PROBE MATERIAL AND LENGTH stainless steel 8 ft. IN.

PREFILTER MATERIAL none

PUMP TYPE diaphram COOLING COIL stainless steel in ice

SAMPLING LOCATION: PORT All POINT 2-7

SAMPLING TIME: START Same as method 5 STOP _____

INTEGRATED SAMPLE TRAIN LEAK CHECKS*					
PRE-TEST	TIME	BY	POST-TEST	TIME	BY
☐ STABLE ☐ LEAKING	09:25	PM	☒ STABLE ☐ LEAKING	12:45	PM

*Vacuum must remain stable for 30 seconds @ 10 in. Hg.

BAG LEAK CHECK PERFORMED BY RST. TIME overnight 7/23/80 - 7/24/80

COMMENTS: _____

KENVIRONS, INC.
DRÄGER DATA FORM

RUN NO. BEC-STK-8 TYPE OF DRÄGER ____ RECORDED BY GR

DATE 7-24-80 ASSISTED BY ____

DISTANCE FROM DUCT INSIDE WALL TO DRÄGER SAMPLE TUBE TIP - ~ 12 IN.

DISTANCE FROM DUCT INSIDE WALL TO METHOD 6 OR 8 PROBE TIP - — IN.

SAMPLE PORT DESIGNATION ~~A~~ and C

ARE BOTH SAMPLES TAKEN FROM SAME PORT? ~~YES~~ ____ NO

IF NO, APPROXIMATE DISTANCE FROM PROBE TIP TO SAMPLE TIP — IN.

WAS DRÄGER SAMPLE TUBE PURGED? ✓ YES ____ NO

IF NO, GIVE REASON FOR NOT PURGING TUBE ____

RUN NO.	TIME	N NO. OF PUMPS FOR SAMPLE	R DRÄGER TUBE READING	R X 10 / N IN PPM
STK-A	10:30	6	145	145
STK-B	13:10	6	125	125
STK-C	13:15	6	136	136

COMMENTS: ____

KENVIRONS, INC.
FYRITE DATA FORM

RUN NO. BEC-STK-5 RECORDED BY PHM

DATE 7/24/80 ASSISTED BY _____

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? _____

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE 12 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1300	A	1	4%	10%

COMMENTS: _____

RUN NO. DEC-STK-8
DATE 7-24-80

KENVIRONS, INC.
CARRIER GAS
ANALYSIS (ORSAT)

ANALYZED BY PAR

ORSAT LEAK CHECKS									
PRE-ANALYSIS					POST-ANALYSIS				
NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY	NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY
1	1502 / 1507	35.4 / 35.4	✓	PR	1	1552 / 1557	32.0 / 32.0	✓	PR
2					2				
3					3				
4					4				

SAMPLE IDENTIFICATION	CO_2 READING 1	READING 2	O_2 (2-1)	READING 3	CO (3-2)	
	10.8	18.4	7.6	18.5	.1	
	10.9	18.5	7.7	18.5	0	
	10.8	18.5	7.7	18.5	0	
	AVG = 10.8		AVG = 7.7		AVG = 0	
	10.8	18.6	7.6	18.6	0	correct 7.8
	10.9	18.6	7.7	18.6	0	
	10.9	18.6	7.7	18.6	0	
	AVG = 10.9		AVG = 7.7		AVG = 0	
Ave	10.85		7.7		0.0	ck RST
	AVG =		AVG =		AVG =	
	AVG =		AVG =		AVG =	

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80019

FACILITY LG+E Cane Run #6

RUN NUMBER BEC-STK-9

FIELD DATES 7-17-80 / 7-26-80

SAMPLING LOCATION Cane Run #6 Stack

SAMPLING DATE 7/25/80

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 Gary Rewleff
2

ENGR. TECHNICIAN 1 Parker Moore
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-STK-8 RECORDED BY: GHR

DATE: 7/25/80 ASSISTED BY:

AMBIENT TEMPERATURE: 82 °F

BAROMETER PRESSURE: 29.84 in. Hg.

READING TIME: 7:45 RECORDED BY: VAL

BAROMETER I.D. 102 CALIBRATION DATE: 5/23/81

CORRECTED BAROMETER PRESSURE: (@ console location)

CONSOLE I.D.: D-328

IN TEMP. DIAL THERMOMETER I.D.: II

OUT TEMP. DIAL THERMOMETER I.D.: I

PROBE I.D. 307 LENGTH: 8 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: VII IMPACT: side B STATIC: side A

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-3112

COLD BOX DIAL THERMOMETER I.D.: C - 1" Dial

HOT BOX DIAL THERMOMETER I.D.: C - 2" Dial

THERMOCOUPLE I.D.: 28 (Kenvirons Shield) LENGHT: 9 FT.

NOZZLE I.D.: 435 SIZE: 0.241

UMBILICAL I.D.: Green LENGTH: 75 FT.

COMMENTS:

RUN NO. BEC-STK-9
DATE 2-25-80

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY GR
ASSISTED BY

I. PROBE ASSEMBLY

A. PROBE LENGTH 8 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER VII
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.192 ~~0.375~~ IN
B. NOZZLE IDENT. NO. 435
C. UMBILICAL LENGTH 75 F
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE MATERIAL	USE AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	518.9g	554.8g	35.9g
2	M	DW	100ML	3% H_2O_2	540.8g	586.8g	46.0g
3	GS	DRY	———	3% H_2O_2	522.6g	537.7g	15.1g
4	M	ADSORBENT**	~200GM.		687.2g	700.2g	13.0g
#4 CONTAINER WEIGHT = ____ GM.				TOTAL MOISTURE ADSORBED			110.0g
WEIGHT WITH ADSORBENT = ____ GM.							

CK RST

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER
** SG = SILICA GEL, D = DRIERITE, O = OTHER

IV CONTROL CONSOLE: ΔHe (PRE-TEST) 1.67 ΔHe (POST-TEST) ____
Y (PRE-TEST) 1.02 Y (POST-TEST) ____

CONSOLE NO. D-328

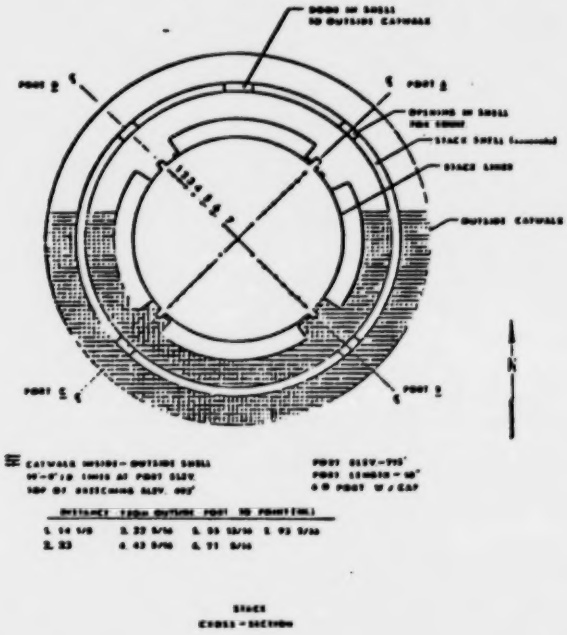
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☐ THERMOCOUPLE (TYPE "K") ☐ OTHER	☐ STANDARD ☒ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ___) ☐ OTHER	☐ PYROMETER (TYPE "K") ☐ OTHER	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ___) ☐ OTHER U-Tube manometer

COMMENTS:

RUN NO. BEC-STK-9 KENVIRONS, INC.

DATE 7-25-80 STACK GEOMETRY RECORDED BY _____

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT 238 IN.

B. PORT LENGTH 10 IN.

STACK DIAMETER: (A-B) 228 IN.

STACK AREA: 40828.1 IN²

FOR RECTANGULAR STACKS

A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT _____ IN.

B. PORT LENGTH _____ IN.

STACK DEPTH: (A-B) _____ IN.

STACK WIDTH (INSIDE) _____ IN.

STACK AREA (DEPTH X WIDTH) _____ IN.

EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$ _____ IN

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS		TYPE OF FLOW OBSTRUCTION
11	DIAMETERS DOWNSTREAM OF	Breeching
13	DIAMETERS UPSTREAM OF	top of stack

NUMBER OF SAMPLING POINTS

MIN. REQ'D. (METHOD 1) 12

USE 28

RUN NO. BEC-STR-9 | KENVIRONS, INC. | RECORDED BY GHR
DATE 7/25/80 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	=	82	°F
	BAROMETRIC PRESSURE Pb = 29.84			
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − 0.22) =		29.62	IN. Hg
ΔH@	REFERENCE ΔH	=	1.60	IN. Hg
TM	AVG. METER TEMPERATURE	=	105	°F
% H_2O	MOISTURE CONTENT	=	15	% BY
Po	STATIC (GUAGE) PRESSURE IN STACK	=	−0.60	IN. H
	x 0.074	=	0.06	IN. Hg
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	=	29.53	IN. Hg
PM	METER PRESSURE (~Pb)	=	29.62	IN. Hg
PS/PM	=			
C	CORRECTION FACTOR	=	0.775	
TS	STACK TEMPERATURE	=	175	°F
ΔP	AVERAGE STACK VELOCITY HEAD	=		IN. H_2
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	=		IN. H_2
D	PROBE TIP DIAMETER	=	~~0.204~~ 0.171	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	100	125	150	175	
ΔPREF				3.1	

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☒ STABLE ☐ LEAKING	GHR + PM	☒ STABLE ☐ LEAKING	GHR + PM
STATIC	☒ STABLE ☐ LEAKING	GHR + PM	☒ STABLE ☐ LEAKING	GHR + PM

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.012 cfm @ 15" Hg	0.004 cfm @ 5.0" Hg
TIME (24 HOUR CLOCK)	10:25 thru tip	13:30 thru tip
BY	GHR + PM	GHR + PM

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STK-4 RECORDED BY GAL
DATE 7/25/80 ASSISTED BY PA
SAMPLING TIME PER POINT 3 MIN.

PORT POINT	CLOCK TIME	METER VOLUME (DCF)	ΔP VEL. HEAD (IN. H_2O)	ΔH ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
A-1	Start/stop 11:40	44.330 45.30	0.50	0.29	90	85	173	250	64	3.4	
" 2		46.35	0.60	0.35	98	85	177	245	63	3.6	
" 3		47.52	0.75	0.44	104	86	173	230	61	4.0	
" 4		48.71	0.75	0.44	108	87	172	240	59	4.0	
" 5		49.92	0.80	0.47	110	88	171	245	59	4.2	
" 6		51.15	0.80	0.47	112	88	176	255	59	4.2	
A " 7	12:06	752.37	0.80	0.47	114	89	178	250	59	4.3	
D-1	12:09	753.34	0.50	0.29	106	92	175	250	67	3.3	
" 2		54.43	0.65	0.38	114	92	179	245	66	3.8	
" 3		55.62	0.75	0.44	116	92	176	250	65	4.1	
" 4		56.84	0.80	0.47	118	92	171	245	63	4.2	
" 5		58.08	0.80	0.47	119	93	177	240	66	4.3	
" 6		59.30	0.80	0.47	120	94	172	250	62	4.3	
D " 7	12:30	760.54	0.80	0.47	121	94	171	250	64	4.3	
C-1	12:35	761.50	0.50	0.29	110	96	174	250	68	3.4	
" 2		62.56	0.60	0.35	115	96	178	240	68	3.7	
" 3		63.78	0.80	0.47	120	96	181	250	67	4.3	
" 4		65.05	0.85	0.50	122	96	179	245	65	4.6	
" 5		66.32	0.85	0.50	122	96	178	240	65	4.6	
" 6		67.60	0.85	0.50	123	96	178	240	64	4.6	
C " 7	12:56	768.87	0.85	0.50	124	96	176	240	62	4.7	

COMMENTS: 1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STR-9
DATE 7/25/81
SAMPLING TIME PER POINT 3 MIN.

RECORDED BY GHR
ASSISTED BY PM

PORT POINT	CLOCK TIME Start/Stop	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT
B -1	13:00	769.85	0.50	0.24	115	98	~~245~~ 170	245	67	3.4	
" 2		71.00	0.70	0.41	121	98	172	245	66	4.0	
" 3		72.28	0.85	0.50	123	98	176	255	66	4.5	
" 4		73.54	0.85	0.50	124	98	169	235	62	4.8	
" 5		74.84	0.85	0.50	124	98	170	242	64	4.8	
" 6		76.07	0.85	0.50	125	98	172	245	65	4.9	
B " 7	13:21	777.342	0.85	0.50	125	98	177	250	67	4.9	

COMMENTS: 1.
2.
3.
4.
5.
6.
7.
8.
9. purged 13:34 - 13
10. @ ΔH ≈ 0.45
11.
12.
13.
14.
15.
16.

KENVIRONS, INC.

RUN NO. BEC-STK-9 | CARRIER GAS | RECORDED BY CGR

DATE 7-25-80 | SAMPLING (ORSAT) | ASSISTED BY

NOTE: SAME AS RUN _____

A. GRAB SAMPLE (EVACUATED BULB)

SAMPLING TRAIN DESCRIPTION:

BULB MATERIAL AND VOLUME _____ ML.

PROBE MATERIAL AND LENGTH _____ IN.

PREFILTER MATERIAL _____

SAMPLING LOCATION: PORT _____ POINT _____

BULB NUMBER	INITIAL BULB VACUUM (IN. Hg)	VACUUM MEASUREMENT TIME (MIN.)	CLOCK TIME (24 HR. CLOCK)

B. INTEGRATED SAMPLE (TEDLAR BAG-TRAIN)

SAMPLING TRAIN DESCRIPTION:

PROBE MATERIAL AND LENGTH stainless steel 8 ft. IN.

PREFILTER MATERIAL None

PUMP TYPE diaphragm COOLING COIL stainless steel coil

SAMPLING LOCATION: PORT All POINT 2-7

SAMPLING TIME: START same as method 5 STOP _____

INTEGRATED SAMPLE TRAIN LEAK CHECKS*					
PRE-TEST	TIME	BY	POST-TEST	TIME	BY
☒ STABLE ☐ LEAKING	0:10:5	pm	☒ STABLE ☐ LEAKING	13:22	pm

*Vacuum must remain stable for 30 seconds @ 10 in. Hg.

BAG LEAK CHECK PERFORMED BY RST . TIME overnight 7/24/80 - 7/25/8

COMMENTS: _____

KENVIRONS, INC.
DRÄGER DATA FORM

RUN NO. BEC-STK-9 TYPE OF DRÄGER ____ RECORDED BY GHR

DATE 7/25/80 ASSISTED BY —

DISTANCE FROM DUCT INSIDE WALL TO DRÄGER SAMPLE TUBE TIP - 12 IN.

DISTANCE FROM DUCT INSIDE WALL TO METHOD 6 OR 8 PROBE TIP - — IN.

SAMPLE PORT DESIGNATION C

ARE BOTH SAMPLES TAKEN FROM SAME PORT? ~~YES~~ NO

IF NO, APPROXIMATE DISTANCE FROM PROBE TIP TO SAMPLE TIP — IN.

WAS DRÄGER SAMPLE TUBE PURGED? ✓ YES ____ NO

IF NO, GIVE REASON FOR NOT PURGING TUBE ____

RUN NO.	TIME	N NO. OF PUMPS FOR SAMPLE	R DRÄGER TUBE READING	R X 10 / N IN PPM
STK-9A	13:40	10	145	145
STK-9B	13:45	10	140	140

COMMENTS: ____

RUN NO. BEC-STK-9

DATE 7/25/80

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY RHM

ASSISTED BY

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? ___

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE 12 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1330	A	1	10½%	21%
1345		2		10½%

COMMENTS: High O_2 in sample 1 caused by ambient air leaking into Fyrite tube thru filter connection. Leak repaired.

RUN NO. BEC-STK-
DATE 7-25-70

KENVIRONS, INC.
CARRIER GAS
ANALYSIS (ORSAT)

ANALYZED BY PR

ORSAT LEAK CHECKS									
PRE-ANALYSIS					POST-ANALYSIS				
NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY	NO.	TIME (START / STOP)	BURETTE LEVEL (START / STOP)	OK	BY
1	1525 / 1530	32.0 / 32.0	✓	PR	1				
2					2				
3					3				
4					4				

SAMPLE IDENTIFICATION	CO_2 READING 1	READING 2	O_2 (2-1)	READING 3	CO (3-2)
Stack #6	10.7	18.5	7.8	18.6	—
	10.7	18.6	7.9	18.6	
	10.7	18.6	7.9	18.6	
	AVG = 10.7		AVG = 7.87		AVG =
	10.7	18.6	7.9	18.6	—
	10.7	18.6	7.9	18.6	
	10.7	18.6	7.9	18.6	
	AVG = 10.7		AVG = 7.90		AVG =
Ave	10.7		7.88		0
	AVG =		AVG =		AVG =
	AVG =		AVG =		AVG =

Ck RST

BECHTEL ACCEPTANCE TEST

KENVIRONS, INC.

PARTICULATE EMISSION TEST

PROJECT NUMBER 80014

FACILITY Bechtel

RUN NUMBER BEC-STK-10

FIELD DATES 7-17-80 / 7-26-80

SAMPLING LOCATION Cane Run #6 Stk

SAMPLING DATE 7/26/80

FIELD CREW

PROJECT CHIEF R.C. Tussey Jr.

TESTING ENGINEER 1 Gary H. Rankett
2

ENGR. TECHNICIAN 1 Parker Moore
2

LAB TECHNICIAN 1
2

OTHER 1
2

KENVIRONS, INC.

EQUIPMENT IDENTFICATION

RUN NO.: BEC-STK-10 RECORDED BY: Cliff

DATE: 7/26/80 ASSISTED BY:

AMBIENT TEMPERATURE: 85 °F

BAROMETER PRESSURE: 29.78 in. Hg.

READING TIME: 7:45 RECORDED BY: RST

BAROMETER I.D. 1012 CALIBRATION DATE: 5/29/80

CORRECTED BAROMETER PRESSURE: (@ console location)

CONSOLE I.D.: D-328

IN TEMP. DIAL THERMOMETER I.D.: II

OUT TEMP. DIAL THERMOMETER I.D.: I

PROBE I.D. 307 LENGTH: 8 FT.

PROBE EXTENSION I.D. — LENGTH: —

PITOT I.D.: VII IMPACT: side B STATIC: side A

PITOT EXTENSION I.D.: — LENGTH: —

SAMPLE BOX I.D.: S-3112

COLD BOX DIAL THERMOMETER I.D.: C - 1" Dial

HOT BOX DIAL THERMOMETER I.D.: C - 2" Dial

THERMOCOUPLE I.D.: 28 (Kenvirons Shield) LENGHT: 9 FT.

NOZZLE I.D.: 435 SIZE: 0.241

UMBILICAL I.D.: Green LENGTH: 75 FT.

COMMENTS:

RUN NO. BEC-STK-10
DATE 7-26-80

KENVIRONS, INC.
SAMPLING TRAIN
SPECIFICATIONS

RECORDED BY GJR
ASSISTED BY

I. PROBE ASSEMBLY

A. PROBE LENGTH 8 FT.
B. LINER MATERIAL stainless steel
C. PITOT NUMBER VII
D. PITOT COEFFICIENT .84

II. MISC. COMPONENTS

A. NOZZLE DIAMETER 0.241
B. NOZZLE IDENT. NO. 435
C. UMBILICAL LENGTH 75
D. FILTER HOLDER TYPE 4" LSI
E. FILTER NUMBER 80042

III IMPINGER CONTENT

NUMBER	TYPE*	NORMAL MATERIAL	NORMAL AMOUNT	USE GHP MATERIAL	USE GHP AMOUNT	FINAL AMOUNT	NET GAIN
1	GS	DW	100ML	80% IPA	518.2g	530.9 g	12.7
2	M	DW	100ML	3% H_2O_2	536.9g	587.8g	50.9
3	GS	DRY	———	3% H_2O_2	526.5	548.1g	21.6
4	M	ADSORBENT**	~200GM.		691.8g	707.2g	15.4
#4 CONTAINER WEIGHT = ____ GM. WEIGHT WITH ADSORBENT = ____ GM.				TOTAL MOISTURE ADSORBED			100.0

* GS = GREENBURG-SMITH, M = MODIFIED, O = OTHER ____
** SG = SILICA GEL, D = DRIERITE, O = OTHER ____

CK RST

IV CONTROL CONSOLE: ΔHθ (PRE-TEST) 1.67 ΔHθ (POST-TEST) ____
Y (PRE-TEST) 1.02 Y (POST-TEST) ____

CONSOLE NO. D-328

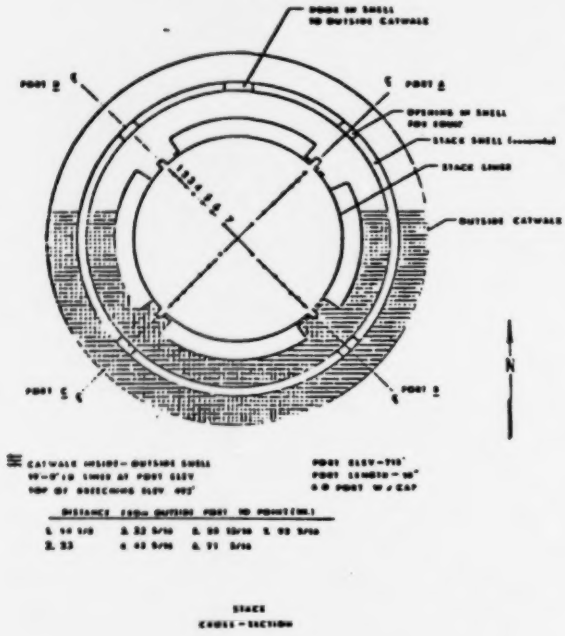
	VELOCITY	TEMPERATURE	PRESSURE
SENSOR	☐ STANDARD ☒ "S" SHAPED	☐ THERMOCOUPLE (TYPE "K") ☐ OTHER ____	☐ STANDARD ☒ "S" SHAPED
READING DEVICE	☒ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENSITIVITY (RANGE ____) ☐ OTHER ____	☐ PYROMETER (TYPE "K") ☐ OTHER ____	☐ DI MANOMETER (0-5 IN. H_2O) ☐ HIGH SENITIVITY (RANGE ____) ☐ OTHER U-Tube manometer

COMMENTS: ____

RUN NO. BEC-STK-10 KENVIRONS, INC.

DATE 7-26-80 STACK GEOMETRY RECORDED BY —

SKETCH OF FLOW PROFILE AND CROSS-SECTION
(ILLUSTRATE PORT-POINT CONFIGURATION, FLOW INTERFERENCES, ETC.)
NOTE: SAME AS RUN _____



FOR ROUND STACKS			FOR RECTANGULAR STACKS		
A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT	238	IN.	A. DISTANCE FROM INSIDE FAR WALL TO OUTSIDE OF PORT		IN.
B. PORT LENGTH	10	IN.	B. PORT LENGTH		IN.
STACK DIAMETER: (A-B)	228	IN.	STACK DEPTH: (A-B)		IN.
STACK AREA:	40828.1	IN^2	STACK WIDTH (INSIDE)		IN.
			STACK AREA (DEPTH X WIDTH)		IN^2
			EQUIVALENT DIAMETER $\left(2\left[\frac{L \times W}{L + W}\right]\right)$		IN.

SAMPLING CROSS-SECTION IS:

NO. OF DUCT DIAMETERS		TYPE OF FLOW OBSTRUCTION
11	DIAMETERS DOWNSTREAM OF	Breeching
13	DIAMETERS UPSTREAM OF	top of stack

NUMBER OF SAMPLING POINTS	
MIN. REQ'D. (METHOD 1)	12
USE	28

RUN NO. BEC-STK-10 | KENVIRONS, INC. | RECORDED BY GHR
DATE 7/26/80 | NOMOGRAPH DATA | CHECKED BY

NOTE: SAME AS RUN _____

TA	AMBIENT TEMPERATURE	= 82	°F
	BAROMETRIC PRESSURE Pb = 29.78		
Pbc	CORRECTED = Pb − (.01 PER 10 FT.) = (Pb − 0.22) =	29.56	IN. Hg.
ΔH@	REFERENCE ΔH	= 1.60	IN. H_2O
TM	AVG. METER TEMPERATURE	= 102	°F
% H_2O	MOISTURE CONTENT	= 15	% BY VOL.
Po	STATIC (GUAGE) PRESSURE IN STACK	= −0.75	IN. H_2O
	x 0.074	= −0.06	IN. Hg.
PS	ABSOLUTE PRESSURE IN STACK, Pb − Po	= 29.50	IN. Hg.
PM	METER PRESSURE (~Pb)	= 29.52	IN. Hg.
PS/PM	= _____		
C	CORRECTION FACTOR	= 0.775	
TS	STACK TEMPERATURE	= 170	°F
ΔP	AVERAGE STACK VELOCITY HEAD	= _____	IN. H_2O
ΔPMAX.	MAXIMUM STACK VELOCITY HEAD	= _____	IN. H_2O
D	PROBE TIP DIAMETER	= ~~0.24~~ 0.172	IN.

Req'd Sampling Rate or Volume _____ Calculated Sampling Rate or Volume (Pre-test) _____

TS	100	125	150	175	
ΔPREF					

PITOT LEAK CHECKS*				
OPENING	PRE-TEST	BY	POST-TEST	BY
IMPACT	☒ STABLE ☐ LEAKING	GHR/PM	☒ STABLE ☐ LEAKING	GHR/PM
STATIC	☒ STABLE ☐ LEAKING	GHR/PM	☒ STABLE ☐ LEAKING	GHR/PM

* Vacuum must remain stable for 15 seconds @ 3 in. H_2O.

SAMPLING TRAIN LEAK CHECKS		
LEAK CHECKS*	PRE-TEST	POST-TEST
RATE OF LEAK (CFM)	0.017 cfm @ 15" Hg	0.003 cfm @ 5" Hg
TIME (24 HOUR CLOCK)	09:30 thru trp	11:24 thru trp
BY	GHR + PM	GHR + PM

* Rates ≤ 0.02 CFM @ 15 in. Hg. vacuum or 4% of average sampling rate (whichever is less) are acceptable.

KENVIRONS, INC.
PARTICULATE
SAMPLING

RUN NO. BEC-STK-10
DATE 7/26/80
SAMPLING TIME PER POINT 3 MIN.

RECORDED BY GHA
ASSISTED BY PK

PORT POINT	CLOCK TIME	785.999 METER VOLUME (DCF)	ΔP VEL. HEAD (IN. H_2O)	ΔH ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
	Start/Stop	-785.999 84.96									
A-1	09:35		0.50	0.29	92	85	165	225	68	3.4	
" 2		86.09	0.65	0.38	103	85	180	240	67	3.5	
" 3		87.15	0.70	0.41	105	86	177	250	65	3.8	
" 4		88.31	0.75	0.44	109	86	175	260	67	4.0	
" 5		89.47	0.75	0.44	110	87	181	250	63	4.0	
" 6		90.64	0.75	0.44	113	88	183	255	64	4.0	
A " 7	09:56	791.81	0.75	0.44	114	88	186	255	62	4.0	
D-1	10:01	792.76	0.50	0.29	107	92	169	270	70	3.2	
" 2		93.85	0.65	0.38	114	92	172	280	69	3.8	
" 3		94.98	0.70	0.41	116	92	177	280	68	3.9	
" 4		96.11	0.70	0.41	119	93	186	275	68	4.0	
" 5		97.29	0.75	0.44	120	94	182	275	68	4.0	
" 6		98.47	0.75	0.44	120	94	185	280	66	4.0	
D " 7	10:22	799.65	0.75	0.44	121	94	178	275	67	4.0	
C-1	10:30	800.61	0.50	0.29	109	97	168	285	68	3.2	
" 2		01.71	0.65	0.38	118	96	171	295	68	3.8	
" 3		02.85	0.70	0.41	121	97	170	295	68	3.9	
" 4		04.00	0.70	0.41	122	97	175	295	67	4.0	
" 5		05.14	0.70	0.41	123	96	172	285	66	4.0	
" 6		06.29	0.70	0.41	124	97	170	290	66	4.0	
C " 7	10.51	807.44	0.70	0.41	124	97	171	290	66	4.0	

COMMENTS: 1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

KENVIRONS, INC.

PARTICULATE

SAMPLING

RUN NO. BEC-STX-10

DATE 7/26/82

SAMPLING TIME PER POINT 3 MIN.

RECORDED BY GHA

ASSISTED BY PA

PORT POINT	CLOCK TIME start/stop	METER VOLUME (DCF)	Δ P VEL. HEAD (IN. H_2O)	Δ H ORIFICE (IN. H_2O)	METER TEMP. IN (°F)	METER TEMP. OUT (°F)	STACK TEMP. (°F)	BOX TEMP. (°F)	BATH TEMP. (°F)	TRAIN VACUUM (IN. Hg)	COMMENT NUMBER
B-1	10:55	808.41	0.50	0.29	115	100	158	300	74	3.2	
" 2		09.52	0.60	0.35	122	99	159	275	73	3.7	
" 3		10.61	0.70	0.41	123	99	158	265	71	4.0	
" 4		11.78	0.70	0.41	124	97	165	245	70	4.0	
" 5		12.98	0.75	0.44	125	98	163	225	67	4.1	
" 6		14.18	0.75	0.44	125	98	167	245	67	4.1	
B " 7	11:16	815.383	0.75	0.44	126	98	168	265	67	4.1	
			.6411	.3982	105.125		172.5				

COMMENTS: 1.

2.

3.

4.

5.

6.

7.

8.

9. purged 11:27 - 11:42

10. @ ΔH = 0.40

11.

12.

13.

14.

15.

16.

KENVIRONS, INC.

RUN NO. BEC-STK-10 | CARRIER GAS | RECORDED BY GHN

DATE 7/26/80 | SAMPLING (ORSAT) | ASSISTED BY PM

NOTE: SAME AS RUN _____

A. GRAB SAMPLE (EVACUATED BULB)

SAMPLING TRAIN DESCRIPTION:

BULB MATERIAL AND VOLUME _____ ML.

PROBE MATERIAL AND LENGTH _____ IN.

PREFILTER MATERIAL _____

SAMPLING LOCATION: PORT _____ POINT _____

BULB NUMBER	INITIAL BULB VACUUM (IN. Hg)	VACUUM MEASUREMENT TIME (MIN.)	CLOCK TIME (24 HR. CLOCK)

B. INTEGRATED SAMPLE (TEDLAR BAG-TRAIN)

SAMPLING TRAIN DESCRIPTION:

PROBE MATERIAL AND LENGTH stainless steel 8ft IN.

PREFILTER MATERIAL none

PUMP TYPE diaphram COOLING COIL stainless steel coil

SAMPLING LOCATION: PORT All POINT 2-7

SAMPLING TIME: START Same as method 5 STOP _____

INTEGRATED SAMPLE TRAIN LEAK CHECKS*					
PRE-TEST	TIME	BY	POST-TEST	TIME	BY
☒ STABLE ☐ LEAKING	09:00	PM	☐ STABLE ☐ LEAKING	11:20	PM

*Vacuum must remain stable for 30 seconds @ 10 in. Hg.

BAG LEAK CHECK PERFORMED BY RST/PFR. TIME overnight 7/25/80 - 7/26

COMMENTS: _____

KENVIRONS, INC.
DRÄGER DATA FORM

RUN NO. BEC-STK-10 TYPE OF DRÄGER ____ RECORDED BY GHR

DATE 7/26/80 ASSISTED BY PM

DISTANCE FROM DUCT INSIDE WALL TO DRÄGER SAMPLE TUBE TIP - 2/2 IN.

DISTANCE FROM DUCT INSIDE WALL TO METHOD 6 OR 8 PROBE TIP - — IN.

SAMPLE PORT DESIGNATION C

ARE BOTH SAMPLES TAKEN FROM SAME PORT? — YES — NO

IF NO, APPROXIMATE DISTANCE FROM PROBE TIP TO SAMPLE TIP — IN.

WAS DRÄGER SAMPLE TUBE PURGED? ✓ YES ____ NO

IF NO, GIVE REASON FOR NOT PURGING TUBE ____

RUN NO.	TIME	N NO. OF PUMPS FOR SAMPLE	R DRÄGER TUBE READING	R X 10 / N IN PPM
STK-10	11:32	10	140	140

COMMENTS: Only one Dräger taken, because only one was available.

Used 3 sets (10 ea.) during wk. @ stk.
(Apr. 1982) Rate 0191282
Draeger CH242, Cat. No. CH24201 PT

RUN NO. BEC-STX-10

DATE 7/26/80

KENVIRONS, INC.
FYRITE DATA FORM

RECORDED BY P+M

ASSISTED BY

WAS FYRITE SAMPLE TUBE PURGED BEFORE SAMPLING? ✓ YES ___ NO

IF NO, WHAT WAS THE REASON? ___

WAS FYRITE ZEROED INITIALLY? ✓ YES ___ NO

WAS CO_2 FYRITE MIXED AT LEAST 4 TIMES? ✓ YES ___ NO

WAS O_2 FYRITE MIXED AT LEAST 6 TIMES? ✓ YES ___ NO

DISTANCE FROM INSIDE DUCT WALL TO END OF FYRITE SAMPLE TUBE 12 IN.

TIME	SAMPLE PORT NO.	FYRITE SAMPLE NO.	CO_2 VALUE	O_2 VALUE
1132	A	1	10%	10%

COMMENTS: ___

Filter Log

	Serial Number	Filter Type	Project Number	Desiccation Data (Initial) Date	Time (24-hour clock)	By	Tare Weight Determination First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Desiccation Data (Final) Date	Time (24-hour clock)	By	Final Weight Determination First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight
2342	79117	4"x01	7904	12-27-79	1600	DAB	1.1956	12-27-79	1046	DAB	1.1958	12-27-79	1630	DAB	1.1958	12-27-79	1500	DAB	1.2163	1-4-79	1054	DAB	1.2158	1-7-79	1341	DAB	1.2158	20.0
2343	79118	↑	7904	↑	↑	↑	1.2402	"	1047	"	1.2402	"	1640	"	"	1.2402	"	"	1.2399	1-4-79	1040	DAB	1.2394	1-7-79	1518	DAB	1.2394	39.2
2344	79119		7904				1.1603	12-27-79	1040	DAB	1.1604	1636	"	"	1.1604	"	"	"	1.1857	1-4-79	1102	"	1.1853	1-7-79	1522	DAB	1.1853	24.9
2339	79120		7904				1.1833	12-27-79	1044	"	1.1835	1638	"	"	1.1835	12-27-79	1800	DAB	1.2357	"	1046	"	1.2354	1-7-79	1501	DAB	1.2354	
	79121						1.1881	12-27-79	1049	"	1.1886	1632	"	"	1.1881													
0380	79122		7904				1.2145	12-27-79	1048	"	1.2147	1631	"	"	1.2147	12-27-79	1300	DAB	1.2483	"	1046	"	1.2481	1-7-79	1537	DAB	1.2481	54.4
2443	79123		7904S				1.1790	"	1040	DAB	1.1791	1627	"	"	1.1790	11-11-80	1400	DAB	1.2210	11-11-80	1110	DAB	1.2210	11-11-80	1107	DAB	1.2210	47.0
2444	79124		7904S				1.2101	"	1037	"	1.2104	1624	"	"	1.2101	"	"	"	1.2787	11-11-80	1107	DAB	1.2789	11-11-80	901	DAB	1.2789	101.5
2445	79125		7904S				1.1873	12-27-79	1036	"	1.1873	1626	"	"	1.1873	11-11-80	1400	DAB	1.2884	"	1109	DAB	1.2886	"	909	DAB	1.2886	101.5
2447	79126						1.2480	12-27-79	1039	DAB	1.2480	1623	"	"	1.2480	2-1-80	1550	DAB	1.3628	2-5-80	927	"	1.3628	2-5-80	935	"	1.3628	122.8
2448	79127						1.1952	12-27-79	1032	"	1.1950	1621	"	"	1.1950	"	"	"	1.3345	"	1931	"	1.3350	"	927	"	1.3345	189.6
2475	79128						1.2018	12-27-79	1030	"	1.2020	1619	"	"	1.2018	"	"	"	1.2650	2-5-80	1923	DAB	1.2655	2-5-80	920	DAB	1.2650	62.7
2476	79129						1.2015	12-27-79	1028	DAB	1.2020	1615	"	"	1.2015	"	"	"	1.2475	"	926	"	1.2479	"	923	"	1.2475	46.6
0535	79130						1.2076	12-27-79	1026	"	1.2076	1614	"	"	1.2076	2-1-80	1300	DAB	1.2956	2-1-80	1100	DAB	1.2958	2-1-80	903	DAB	1.2956	88.0
	79131						1.1992	12-27-79	1025	DAB	1.1992	1615	"	"	1.1992	"	"	"	1.2482	2-1-80	1102	"	1.2482	"	1104	"		
	79132						1.0865	12-27-79	1023	DAB	1.0866	1617	"	"	1.0865	"	"	"	1.1800	"	1104	"	1.1805	2-1-80	1101	DAB		
2465	79133			12-27-79	1600	DAB	1.1534	12-27-79	1029	DAB	1.1535	1619	"	"	1.1534	2-2-80	1800	DAB	1.3657	2-2-80	1222	DAB	1.3657	2-2-80	1305	"	1.3657	412.3
2381	79134		7904	"	"	"	1.1539	12-27-79	1029	DAB	1.1539	1617	12-27-79	DAB	1.1539	12-27-79	1300	DAB	1.3623	1-4-79	1067	DAB	1.3620	1-7-79	1514	DAB	1.3620	208.1
	79135			12-27-79	1600	DAB	1.2220	"	1022	"	1.2219	1619	"	"	1.2220													
2466	79136			↑	↑	↑	1.1132	12-27-79	1017	DAB	1.1131	1612	"	"	1.1131	2-1-80	1550	DAB	1.2415	2-5-80	926	DAB	1.2400	2-5-80	926	DAB	1.2415	128.4
2466	79137	↓					1.1223	"	1020	DAB	1.1225	1608	"	DAB	1.1223	"	"	"	1.2604	"	929	"	1.2607	"	929	"	1.2607	138.0
	79138	4"x01		12-27-79	1600	DAB	1.1538	12-27-79	1016	DAB	1.1536	1602	"	DAB	1.1536													
2500	79139						1.1412	12-27-79	1310	DAB	1.1413	1100	12-27-79	DAB	1.1412	2-22-80	1600	DAB	1.2089	2-25-80	1032	DAB	1.2090	2-25-80	955	DAB	1.2090	66.8
2593	79140						1.1387	"	1316	"	1.1387	1601	12-27-80	DAB	1.1387	"	"	"	1.1987	"	1033	"	1.1993	"	958	"	1.1993	62.6
2596	79141						1.1488	"	1314	"	1.1489	1603	"	"	1.1488	2-27-80	1600	DAB	1.3218	"	1038	"	1.3209	"	960	DAB	1.3208	720
2596	79142						1.1260	"	1330	"	1.1264	1605	"	"	1.1260	2-27-80	1700	DAB	1.3780	3-5-80	958	DAB	1.3765	3-6-80	1140	DAB	1.3760	
	79143						1.1943	"	1330	"	1.1944	1607	"	"	1.1943													
2597	79144						1.1723	"	1326	"	1.1725	1608	"	"	1.1723	2-27-80	1700	DAB	1.4370	3-5-80	957	DAB	1.4375	3-6-80	1141	DAB	1.4370	259.7
2446	79145						1.1774	"	1322	"	1.1774	1610	"	"	1.1774	2-1-80	1600	DAB	1.7966	3-6-80	1020	DAB	1.7965	3-6-80	1301	"	1.7966	619.1
STR-1 3028	79146						1.1575	12-27-80	1328	DAB	1.1570	1611	"	"	1.1575				1.2136	2-2-80	1632	DAB	1.2140	2-2-80	1104	DAB	1.2136	56.3

[illegible], INC.
FILTER WEIGHT LOG

					DESICCATION DATA (INITIAL)			TARE WEIGHT DETERMINATION									DESICCATION DATA (FINAL)			FINAL WEIGHT DETERMINATION									
		Serial Number	Filter Type	Project Number	Date	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Date	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight
STK-8	3123	79177			[illegible]	9:30	DAB	1.1380	2/21/80	0946	VT	1.1385	2/21/80	1548	VT	1.1380				11392	8-11-80	1644	DAB	11852	8-12-80	1114	DAB	11852	472
ESP-A-8	3119	79178			"	"	"	1.1402	"	0944	VT	1.1407	2/21/80	1545	VT	1.1402				1.4435	8-11-80	1632	DAB	1.4430	8-12-80	1106	DAB	1.4430	3029
ESP-U-9	3117	79179			[illegible]	9:30	DAB	1.1433	"	0947	VT	1.1438	"	1549	VT	1.1433				1.4593	8-11-80	1722	DAB	1.4591	8-12-80	1302	DAB	1.4591	3158

[illegible], INC.
FILTER WEIGHT LOG

				Desiccation Data (Initial)			Tare Weight Determination									Desiccation Data (Final)			Final Weight Determination									
		Serial Number	Filter Type	Project Number	Date	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Date	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight
		80033	4"	80013	[illegible]	1400	VT	1.1406	5/29/80	1019	VT	1.1410	5/29	1710	VT	1.1406													
		80034	"	"	"	"	"	1.1058	"	0951	"	1.1061	"	1642	"	1.1058													
		80035	"	"	"	"	"	1.1110	"	0955	"	1.1113	"	1646	"	1.1110													
		80036	"	"	"	"	"	1.1269	"	0956	"	1.1273	"	1645	"	1.1269													
		80037	"	"	"	"	"	1.1495	"	0957	"	1.1497	"	1649	"	1.1495													
		80038	"	"	"	"	"	1.1249	"	0958	"	1.1252	"	1647	"	1.1249													
		80039	"	"	"	"	"	1.1106	"	0959	"	1.1110	"	1648	"	1.1106													
LSP A 9	3134	80040	"	"	"	"	"	1.1004	"	1000	"	1.1009	"	1650	"	1.1004	7-29-80	1000	DAB	1.4240	8-11-80	1730	DAB	1.4245	8-12-80	1310	DAB	1.4240	323.6
STK-9	3130	80041	"	"	"	"	"	1.1364	"	1001	"	1.1369	"	1652	"	1.1364	"	"	"	1.2039	8-11-80	1728	DAB	1.2041	8-12-80	1308	DAB	1.2039	675
STK-10	3151	80042	"	"	"	"	"	1.1067	"	1002	"	1.1071	"	1651	"	1.1067	"	"	"	1.1607	8-11-80	1640	DAB	1.1612	8-12-80	1110	DAB	1.1607	540
LSP A 10	3150	80043	"	"	"	"	"	1.1281	"	1003	"	1.1286	"	1653	"	1.1281	"	"	"	1.4728	8-11-80	1710	DAB	1.4731	"	1134	DAB	1.4728	344.7
LSP-R-9	3142	80044	"	"	"	"	"	1.1445	"	1004	"	1.1450	"	1654	"	1.1445	7-29-80	1000	DAB	1.3639	8-11-80	1712	DAB	1.3639	"	1144	DAB	1.3634	218.9
		80045	"	"	"	"	"	1.0897	"	1005	"	1.0902	"	1655	"	1.0897													
		80046	"	"	"	"	"	1.1386	"	1006	"	1.1391	"	1656	"	1.1386													
		80047	"	"	"	"	"	1.1289	"	1008	"	1.1294	"	1657	"	1.1289													
		80048	"	"	"	"	"	1.1926	"	1020	"	1.1931	"	1709	"	1.1926													
		80049	"	"	"	"	"																						
		80000	"	"	"	"	"	1.1234	"	0948	"	1.1236	"	1638	"	1.1234													
		80028	"	"	"	"	"	1.0867	"	1018	"	1.0872	"	1708	"	1.0867													

	Serial Number	Filter Type	Project Number	Desiccation Date (initial)	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Desiccation Date (final)	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight (mg)
	79147																											
STA-A-1	30277	79148					1.1495	4-9-80	1534	DAB	1.1496	4-9-80	1812	DAB	1.1495													
STA-A-11	30224	79149					1.1225	4-9-80	1520	DAB	1.1227	"	1817	"	1.1225													
STA-B-2	3029	79150					1.2102	"	1359	"	1.2108	"	1819	"	1.2107													
STA-B-3	3039	79151	4"				1.1089	"	1337	"	1.1087	"	1815	"	1.1088													
STA-B-E	3040	79152		2-20-80	9:20	DAB	1.2326	2-21-80	0945	VT	1.2331	2-26-80	1546	VT	1.2326				1.2389	8-11-80	714	DAB	1.3174	8-12-80	1146	DAB	1.3069	264.4
STA-3	3052	79153		"	"	"	1.2372	"	0941	VT	1.2367	"	1542	VT	1.2367				1.4316	8-11-80	1711	DAB	1.4321	8-12-80	1138	DAB	1.4316	221.4
STA-3-3	3045	79154		"	"	"	1.2165	"	0939	VT	1.2163	"	1540	VT	1.2163				1.2576	8-11-80	1630	DAB	1.2571	8-12-80	1102	DAB	1.2571	149.4
		79155		"	"	"	1.1753	"	0940	VT	1.1750	"	1541	VT	1.1750				1.2907	8-11-80	701	DAB	1.2911	"	1130	DAB	1.2911	58.5
STA-3-3	3044	79156		"	"	"	1.1886	"	0941	VT	1.1881	"	1544	VT	1.1881				1.2355	8-11-80	1642	DAB	1.2230	8-12-80	1112	DAB	1.6230	386.3
		79157		"	"	"	1.1456	"	0938	VT	1.1454	"	1538	VT	1.1454				1.2773	"	1738	DAB	1.2773	"	1319	DAB	1.2773	61.0
STA-4	3060	79158		"	"	"	1.2045	"	0936	VT	1.2043	"	1537	VT	1.2043				1.5727	"	1740	DAB	1.5731	"	1325	DAB	1.5727	347.7
STA-4-E	3049	79159		"	"	"	1.2322	2-21-80	0936	VT	1.2321	"	1536	VT	1.2320				1.5877	8-11-80	1740	DAB	1.5883	8-12-80	1322	DAB	1.5877	442.3
STA-5	3077	79160		"	"	"	1.2220	2-21-80	0932	VT	1.2218	"	1535	VT	1.2218				1.2906	8-11-80	1734	DAB	1.2911	8-12-80	1316	DAB	1.2906	58.6
	2618	79161		"	"	"	1.1969	"	0934	VT	1.1967	"	1531	VT	1.1967				1.5799	"	1736	"	1.5802	"	1318	DAB	1.5799	358.1
	2619	79162		"	"	"	1.1145	2-21-80	0929	VT	1.1150	"	1529	VT	1.1160	2-4-80	900	DAB	1.2345	8-11-80	713	DAB	1.2320	8-12-80	1140	DAB	1.2570	60.3
	V010	79163		"	"	"	1.1999	"	0931	VT	1.1997	"	1530	VT	1.1997	"	"	"	1.2842	3-6-80	1016	DAB	1.2540	8-12-80	1137	DAB	1.2540	68
	2731	79164		"	"	"	1.2396	2-21-80	0935	DAB	1.2361	"	1533	VT	1.2361				1.3648	3-6-80	1062	DAB	1.3649	3-12-80	1125	DAB	1.3646	164.8
	2732	79165		"	"	"	1.2410	"	0928	VT	1.2410	"	1534	VT	1.2410	3-21-80	1000	DAB	1.2465	3-26-80	948	DAB	1.2461	3-26-80	1612	DAB	1.2461	5.1
	2733	79166		"	"	"	1.1993	"	0958	VT	1.1998	"	1558	VT	1.1993	"	"	"	1.2041	"	952	DAB	1.2037	"	1615	"	1.2037	4.4
STA-B-1	3034	79167		"	"	"	1.2025	"	1000	VT	1.2024	"	1600	VT	1.2025	3-21-80	1000	DAB	1.2077	"	950	DAB	1.2074	"	1619	"	1.2074	
STA-B-2	3038	79168		"	"	"	1.2077	"	0957	VT	1.2081	"	1602	VT	1.2079				1.4988	8-11-80	1659	DAB	1.4992	8-12-80	1128	DAB	1.4992	291.5
STA-B-5	3072	79169		"	"	"	1.1595	"	0958	VT	1.1600	"	1601	VT	1.1596				1.5916	8-11-80	1652	DAB	1.5919	8-12-80	1122	DAB	1.5919	432.4
STA-6	3078	79170		"	"	"	1.1715	"	0956	VT	1.1719	"	1556	VT	1.1718				1.4653	8-11-80	1657	DAB	1.4850	8-12-80	1126	DAB	1.4850	313.5
STA-6	3071	79171		"	"	"	1.1892	"	0952	VT	1.1891	"	1553	VT	1.1892				1.4989	8-11-80	1659	DAB	1.4987	8-12-80	1124	DAB	1.4987	499.5
STA-AB	3090	79172		"	"	"	1.2120	"	0955	VT	1.2125	"	1557	VT	1.2120				1.2675	8-11-80	1720	DAB	1.2669	"	1300	DAB	1.2669	5.8
STA-7	3107	79173		"	"	"	1.1489	"	0953	VT	1.1487	"	1552	VT	1.1488				1.6291	8-11-80	1646	DAB	1.5281	8-12-80	1116	DAB	1.5281	379.2
STA-7	3108	79174		"	"	"	1.2070	"	0949	VT	1.2075	"	1550	VT	1.2070				1.2512	8-11-80	1650	DAB	1.2515	8-12-80	1120	DAB	1.2512	44.2
STA-7	3092	79175		"	"	"	1.1930	"	0951	VT	1.1940	"	1554	VT	1.1935				1.4725	8-11-80	1641	DAB	1.4721	8-12-80	1118	DAB	1.4721	248.9
STA-7	3105	79176		"	"	"	1.1725	"	0950	VT	1.1732	"	1555	VT	1.1728				1.5470	8-11-80	1724	DAB	1.5466	"	1304	DAB	1.5466	291.8
				2-20-80	9:20	DAB	1.1828	"	0948	VT	1.1823	"	1551	VT	1.1828				1.4695	8-11-80	1726	DAB	1.4700	"	1309	DAB	1.4695	286.7

Reproduced from best available copy.

[illegible], INC.
FILTER WEIGHT LOG

					DESICCATION DATA (INITIAL)			TARE WEIGHT DETERMINATION									DESICCATION DATA (FINAL)			FINAL WEIGHT DETERMINATION									
		Serial Number	Filter Type	Project Number	Date	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Date	Time (24-hour clock)	By	First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight
ESP-A-8	3120	63						97[illegible]	8-11-80	1507	DAB	97[illegible]	8-11-80	2077	DAB	97[illegible]				97[illegible]	8-13-80	1012	DAB	97[illegible]	8-13-80	1556	DAB	97[illegible]	0.5
ESP-A-10	3147	64						10[illegible]	8-11-80	1505	DAB	10[illegible]	8-11-80	2026	DAB	10[illegible]				10[illegible]	8-13-80	959	DAB	10[illegible]	8-13-80	1551	DAB	10[illegible]	0.1
ESP-B-10	3145	65						10[illegible]	8-11-80	1509	DAB	10[illegible]	8-11-80	2029	DAB	10[illegible]				10[illegible]	8-13-80	1005	DAB	10[illegible]	11	1533	DAB	10[illegible]	0.5

	Serial Number	Filter Type	Project Number	Designation Used (Initial) Date	Time (24-hour clock)	By	Tare Weight First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Designation Used (Final) Date	Time (24-hour clock)	By	Final Weight First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight
ESP-A-7	3110	32					1243020	9-7-80	1520	DAB	1008989	9-8-80	1331	DAB	1008980				1013903	9-12-80	1404	DAB	1013880	9-12-80	1412	DAB	1013801	4711
ESP-A-8	3124	33					1094629	9-7-80	1522	DAB	1094628	9-8-80	1324	DAB	1094625				1094704	9-12-80	1414	DAB	1094704	"	1406	DAB	1094704	5075
ESP-B-5	3074	34					1019531	9-7-80	1431	DAB	1019566	9-7-80	1507	DAB	1019544				1027317	"	1430	DAB	1027317	"	1418	DAB	1027317	7553
STK-6	3101	35					1007877	9-7-80	0935	DAB	1007877	9-7-80	1501	DAB	1007882				1009202	9-12-80	1340	DAB	1009202	9-12-80	1336	DAB	1009202	378
ESP-B-8	3118	36					974009	9-7-80	1538	DAB	1974009	9-7-80	1325	DAB	974009				978213	9-12-80	1400	DAB	978213	9-12-80	1304	DAB	978212	5203
ESP-A-9	3143	37					1095336	9-7-80	1524	DAB	1095336	9-7-80	1325	DAB	1095336				1098218	"	1402	DAB	1098218	9-12-80	1317	DAB	1098216	586.0
ESP-B-9	3137	38					996520	9-7-80	1526	DAB	996505	9-8-80	1353	DAB	996520				1005764	9-12-80	1394	DAB	1005764	9-12-80	1302	DAB	1005766	926.6
" " A-6	3096	39					1079559	9-7-80	929	DAB	1078580	"	1502	DAB	1078584				1012584	"	1342	DAB	1012584	9-12-80	1338	DAB	1012584	834.3
ESP-C-6	3098	40					1014575	9-7-80	917	DAB	1014559	9-7-80	1500	DAB	1014559				1027402	9-12-80	1019	DAB	1027402	"	1559	DAB	1027402	1289.8
STK-10	3156	41					1028488	9-7-80	1530	DAB	1028488	9-7-80	1357	DAB	1028488				1029956	"	1356	DAB	1029952	9-12-80	1300	DAB	1029952	324
" " A-10	3149	42					1086509	9-7-80	1536	DAB	1086509	9-7-80	1322	DAB	1086509				1027375	"	1352	DAB	1027375	9-12-80	1330	DAB	1027375	877.5
ESP-A-10	3144	43					1074142	9-7-80	1529	DAB	1074142	9-7-80	1329	DAB	1074142				1099203	"	1347	DAB	1099202	9-12-80	1315	DAB	1099203	493.1
STK-9	3115	44					1010988	9-7-80	923	DAB	1010988	9-7-80	1515	DAB	1010988				1012209	"	1412	DAB	1012205	"	1240	DAB	1012205	554.1
ESP-B-9	3103	45					1004977	9-7-80	9:15	DAB	1004977	9-7-80	1503	DAB	1004977				1013322	"	1350	DAB	1013322	9-12-80	1332	DAB	1013322	637.7
STK-6	3100	46					1012722	9-8-80	1301	DAB	1012722	9-11-80	2014	DAB	1012722				1012728	9-12-80	0951	DAB	1012728	"	1554	DAB	1012728	0.8
ESP-A-9	3132	47					1005179	9-8-80	1444	DAB	1005179	9-11-80	2016	DAB	1005179				1005762	9-12-80	0957	DAB	1005762	"	1641	DAB	1005762	0.3
STK-5	3084	48					1021095	9-11-80	1500	DAB	1021095	"	2017	DAB	1021095				1021095	9-12-80	0956	DAB	1021095	"	1546	DAB	1021095	0.4
ESP-A-6	3075	49					1099473	9-8-80	1430	DAB	1099473	9-11-80	2016	DAB	1099474				1096370	9-12-80	0940	DAB	1096370	"	1525	DAB	1096370	0.1
ESP-A-5	3027	50					1094259	9-11-80	1436	DAB	1094259	9-11-80	2012	DAB	1094259				1095839	9-12-80	0940	DAB	1095839	"	1521	DAB	1095839	0.1
STK-7	3114	51					1037772	9-11-80	1502	DAB	1037772	"	2019	DAB	1037772				1037772	9-12-80	1010	DAB	1037772	"	1529	DAB	1037772	0.7
ESP-B-6	3079	52					1076562	9-11-80	1432	DAB	1076562	9-11-80	2014	DAB	1076562				1037772	9-12-80	0939	DAB	1037772	"	1515	DAB	1037772	0.5
ESP-A-8	3097	53					996343	9-11-80	1438	DAB	996343	9-11-80	2014	DAB	996343				1076562	9-12-80	1127	DAB	1076562	"	1517	DAB	1076562	0.3
STK-8	3126	54					1104651	9-11-80	1456	DAB	1104651	"	2014	DAB	1104651				996343	9-12-80	0935	DAB	996343	"	1513	DAB	996343	0.0
ESP-L-7	3102	55					1010284	9-11-80	1434	DAB	1010284	9-11-80	2015	DAB	1010284				1104651	9-12-80	0946	DAB	1104651	"	1527	DAB	1104651	0.4
ESP-A-7	3125	56					990118	9-11-80	1440	DAB	990118	9-11-80	2014	DAB	990118				1010574	9-12-80	0901	DAB	1010574	"	1550	DAB	1010574	29.2
STK-9	3109	57					996332	9-11-80	1436	DAB	996332	"	2035	DAB	996332				990127	9-12-80	0903	DAB	990127	"	1548	DAB	990127	0.4
ESP-B-8	3139	58					1021448	9-11-80	1442	DAB	1021448	9-11-80	2022	DAB	1021448				996340	9-12-80	0908	DAB	996340	"	1558	DAB	996340	0.7
STK-9	3122	59					1066007	9-11-80	1450	DAB	1066007	"	2013	DAB	1066007				1021448	9-12-80	0944	DAB	1021448	"	1527	DAB	1021448	0.4
STK-10	3138	60					1086720	9-11-80	1436	DAB	1086720	9-11-80	2014	DAB	1086720				1066007	9-12-80	0942	DAB	1066007	"	1523	DAB	1066007	33.1
ESP-B-9	3136	62					1048027	9-11-80	1448	DAB	1048027	9-11-80	2021	DAB	1048027				1086720	9-12-80	0951	DAB	1086720	"	1529	DAB	1086720	0.2
																			1048027	9-12-80	0947	DAB	1048027	"	1514	DAB	1048027	0.1

Reproduced from best available copy.

	Serial Number	Filter Type	Project Number	Desiccator Date (Initial) Date	Time (24-hour clock)	By	Tare Weight Determination: First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Tare Weight	Desiccator Date (Final) Date	Time (24-hour clock)	By	Final Weight Determination: First Weight	Date	Time (24-hour clock)	By	Second Weight	Date	Time (24-hour clock)	By	Final Weight	Net Weight
STK-2	3018	1	Becker	90009	7-29-80	100	DAB	99.3027	7-30-80	955	DAB	99.3027	7-30-80	1032	DAB	99.3027			99.3026	7-6-80	1047	DAB	99.3026	8-1-80	1330	DAB	99.3025	0.3
STK-1	3020	2	"	"			109.5524	7-29-80	1339	DAB									109.5524	8-1-80	959	DAB					109.5524	0.2 mg
STK-3	3017	3	"	"			107.6723	7-30-80	951	DAB	107.6722	7-30-80	1347	DAB	107.6723				107.6722	8-6-80	1289	DAB	107.6722	8-7-80	9:07	DAB	107.6722	0.3 mg
		4	"	"						DAB																		
		5	"	"						DAB																		
STK-1	3023	6	"	"			102.1494	7-29-80	1331	DAB																		
STK-2	3027	7	"	"			103.0695	7-30-80	9:54	DAB	103.0694	7-30-80	1010	DAB	103.0694				103.0694	8-1-80	930	DAB						239 mg
ESP-B-1	3022	8	"	"			109.9461	7-29-80	1335	DAB									109.9461	8-6-80	1224	DAB	109.9461	8-7-80	1332	DAB	109.9461	35.0
ESP-B-1	3031	9	"	"			108.5424	7-30-80	956	DAB	108.5424	7-30-80	1026	DAB	108.5424				108.5424	8-6-80	952	DAB						0.2 mg
		10	"	"															108.5424	8-6-80	1247	DAB	108.5424	8-12-80	1330	DAB	108.5424	0.6
		11	"	"																								
STK-5	3018	12	"	"			109.5521	8-1-80	1349	DAB	109.5520	8-7-80	1548	DAB	109.5520													
ESP-B-1	3025	13	"	"			108.8032	7-29-80	1338	DAB									108.7832	8-12-80	1810	DAB	108.7832	8-13-80	1602	DAB	108.7832	30.16
	3058	14	"	"			107.9485	7-29-80	945	DAB	107.9485	8-1-80	1341	DAB	107.9480				107.9480	8-6-80	934	DAB						699.2
ESP-B-2	3039	15	"	"			110.8227	7-30-80	943	DAB	110.8227	8-1-80	1024	DAB	110.8227				110.8227	8-6-80	1250	DAB	110.8224	8-8-80	9:00	DAB	110.8224	36.4
ESP-A-3	3050	16	"	"			96.9426	7-30-80	939	DAB	96.9426	8-1-80	1354	DAB	96.9426				96.9426	8-6-80	1062	DAB	96.9426	8-8-80	1247	DAB	96.9426	3.3
ESP-A-2	3041	17	"	"			100.6619	7-30-80	936	DAB	100.6619	8-1-80	1015	DAB	100.6619				100.6619	8-6-80	1256	DAB	100.6619	8-7-80	9:19	DAB	100.6619	0.2
ESP-A-2	3042	18	"	"			108.8630	7-30-80	958	DAB	108.8630	7-30-80	1023	DAB	108.8630				108.8630	8-6-80	1248	DAB	108.8629	8-12-80	1332	DAB	108.8629	
ESP-A-1	3061	19	"	"			102.1094	7-30-80	1337	DAB									102.1094	8-6-80	1000	DAB	102.1094	8-12-80	1289	DAB	102.1094	43.1
ESP-A-3	3051	20	"	"			101.7327	7-30-80	947	DAB	101.7326	8-1-80	1040	DAB	101.7326				101.7326	8-6-80	936	DAB						0.1 mg
ESP-A-5	3086	21	"	"			99.9371	7-30-80	941	DAB	99.9370	8-1-80	1552	DAB	99.9370				99.9370	8-6-80	1252	DAB	99.9367	8-7-80	9:03	DAB	99.9367	75.2.8
ESP-A-1	3024	22	"	"			109.8225	7-30-80	1339	DAB									109.8225	8-12-80	1442	DAB	109.8225	8-13-80	1422	DAB	109.8225	96.5.1
ESP-B-3	3049	23	"	"			104.4974	7-30-80	949	DAB	104.4974	8-1-80	1359	DAB	104.4974				104.4974	8-6-80	938	DAB						4076
ESP-B-3	3047	24	"	"			103.2382	7-29-80	1341	DAB	103.2382	8-1-80	1357	DAB	103.2382				103.2382	8-6-80	1258	DAB	103.2382	8-7-80	9:11	DAB	103.2382	0.2
		25																	104.3585	8-6-80	1254	DAB	104.3585	8-7-80	9:05	DAB	104.3585	1118.2
STK-4	3068	26					110.8244	8-7-80	958	DAB	110.8244	8-7-80	1423	DAB	110.8244				110.8238	8-12-80	1426	DAB	110.8238	8-13-80	1410	DAB	110.8238	0.9
STK-4	3001	27					109.9232	8-7-80	926	DAB	109.9232	8-7-80	1434	DAB	109.9232				109.9232	8-12-80	1444	DAB	109.9232	8-13-80	1310	DAB	109.9232	32.5
	3061	28					101.5252	8-7-80	920	DAB	101.5252	8-7-80	1420	DAB	101.5252				101.5251	8-12-80	1420	DAB	101.5251	8-12-80	1320	DAB	101.5251	0.7
ESP-A-4	3065	29					101.6199	8-7-80	924	DAB	101.6199	8-7-80	1422	DAB	101.6199				101.6199	8-12-80	1400	DAB	101.6199	8-12-80	1400	DAB	101.6199	
ESP-B-4	3073	30					101.5324	8-7-80	922	DAB	101.5324	8-7-80	1424	DAB	101.5324				102.3235	8-12-80	1408	DAB	102.3234	8-13-80	1346	DAB	102.3234	73.2.6
ESP-B-4	3021	31					108.9718	8-7-80	930	DAB	108.9718	8-7-80	1429	DAB	108.9718				108.9718	8-12-80	1247	DAB	108.9718	8-13-80	1312	DAB	108.9717	0.8
							99.9416	8-7-80	1330	DAB	99.9416	8-7-80	1335	DAB	99.9416				99.9416	8-12-80	1335	DAB	99.9416	8-13-80	1318	DAB	99.9417	0.1 mg

Reproduced from best available copy.

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-1 Date 7/29/80 By DAB / 2nd Calc. 8/13-14/80 RLM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3021 Final Beaker Weight: 102109.5 mg.

Acetone Volume: 109 ml. Beaker Tare Weight: 102109.4 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.1 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.1 mg. ÷ 109 ml. = 0.000917 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.7 mg/ml) x 100

% Blank Residual = 0.000917 mg/ml ÷ 785.7 mg/ml x 100 = 0.00012 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.000917 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No: Bec-ESP-IA-1 **ACETONE RINSE** Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3024 Final Beaker Weight: 109740.1 mg.

Acetone Volume: 328 ml. Beaker Tare Weight: 109332.5 mg.

Blank Correction = Acetone Volume x Acetone Rinse Net Weight: 407.6 mg.

Allowable Blank Residual Minus Blank Correction: 0.3 mg.

Blank Correction = Corrected Net Weight: 407.3 mg.

328 ml. x 0.0009 mg/ml = 0.3 mg. Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79149 Final Filter Weight: 1431.6 mg.

Sample No.: 3026 Filter Tare Weight: 1210.2 mg.

Filter Net Weight: 221.4 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 221.4 mg.

Sample Weight From Acetone Rinse: 407.3 mg.

Total Sample Weight: 628.7 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESPA-2 Date 7/31/80 By DAB / 2nd Calc. 8-19-80 FAM

==========

ACETONE BLANK

Visual Observations: clear By: DAB

Sample No.: 3041 Final Beaker Weight: 100862.6 mg.

Acetone Volume: 100 ml. Beaker Tare Weight: 100861.9 mg.

Any Noted Acetone Loss: no Acetone Blank Net Weight: 0.7 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.7 mg. ÷ 100 ml. = 0.007 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.007 mg/ml ÷ 784.9 mg/ml x 100 = 0.00089 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.007 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = ____ mg/ml

==========

ACETONE RINSE

Run No. Bec-ESP-A-2 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3042

Acetone Volume: 330 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction =

330 ml. x 0.007 mg/ml = 2.3 mg.

Final Beaker Weight: 109276.1 mg.

Beaker Tare Weight: 108838.0 mg.

Acetone Rinse Net Weight: 438.1 mg.

Minus Blank Correction: 2.3 mg.

Corrected Net Weight: 435.8 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79152

Sample No.: 3040

Final Filter Weight: 1623.0 mg.

Filter Tare Weight: 1236.7 mg.

Filter Net Weight: 386.3 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 386.3 mg.

Sample Weight From Acetone Rinse: 435.8 mg.

Total Sample Weight: 822.1 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

August 6, 1980

Analytical Log

Due to a malfunctioning valve in one of the desiccators the acetone evaporations from Day 2 may have been cross-contaminated, and some particulate lost in the desiccator. ESP-B-2 acetone rinse beaker was closest to the valve. Beakers ESP-A-2 acetone rinse and ESP-B-2 acetone blank were the only 2 beakers immediatly adjacent to ESP-B-2 beaker. They received some loose dust from the ESP-B-2 spill. This loose dust, however, was deposited on top of firmly caked particulate matter in ESP-A-2 acetone rinse beaker and could be removed simply by pouring the loose dust back into ESP-B-2 acetone rinse beaker: loose dust also fell into ESP-B-2 acetone blank (empty) and was returned to ESP-B-2 acetone rinse in the same manner. The remainder of the loose dust was deposited within the desiccator itself and was returned to ESP-B-2 acetone rinse beaker using a camel hair brush and tweezers, although some particulate loss did occur. Below is a list of all beakers that were in the desiccator at the time of the spill, and the amount of contamination that each received:

Stk-2 Acetone Rinse	-	No Contamination
Stk-2 Acetone Blank	-	No Contamination
ESP-A-2 Acetone Rinse	-	Some Contamination
ESP-A-2 Acetone Blank	-	No Contamination
ESP-B-2 Acetone Rinse	-	Loss of Particulate
ESP-B-2 Acetone Blank	-	Some Contamination

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-3 Date 7/31/80 By DAB/2nd Calc 8/13-14/80 PHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3050 Final Beaker Weight: 96943.1 mg.

Acetone Volume: 207 ml. Beaker Tare Weight: 96942.9 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.2 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.2 mg. ÷ 207 ml. = 0.00097 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.7 mg/ml) x 100

% Blank Residual = 0.00097 mg/ml ÷ 785.7 mg/ml x 100 = 0.00012 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00097 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = ____ mg/ml

==========

Run No. ESP-A-3 **ACETONE RINSE** Project No. 80019

Visual Observations: By: DAB

Sample No.: 3051

Acetone Volume: 440 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 440 ml. x 0.0007 mg/ml = 0.4 mg.

Final Beaker Weight: 102491.7 mg.

Beaker Tare Weight: 101738.9 mg.

Acetone Rinse Net Weight: 752.8 mg.

Minus Blank Correction: 0.4 mg.

Corrected Net Weight: 752.4 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79156

Sample No.: 3044

Final Filter Weight: 1587.7 mg.

Filter Tare Weight: 1145.4 mg.

Filter Net Weight: 442.3 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 442.3 mg.

Sample Weight From Acetone Rinse: 752.4 mg.

Total Sample Weight: 1194.7 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-4 Date 7/31/80 By DAB/ 2nd Chk. 8/13-14/80 [illegible]

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3061 Final Beaker Weight: 101576.4 mg.

Acetone Volume: 100 ml. Beaker Tare Weight: 101575.7 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.7 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.7 mg. ÷ 100 ml. = 0.007 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.007 mg/ml ÷ 7849 mg/ml x 100 = 0.00089 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.007 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No.: Bec-ESP-A-4 **ACETONE RINSE** Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3065

Acetone Volume: 405 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction =

405 ml. x 0.007 mg/ml = 2.8 mg.

Final Beaker Weight: 102335.7 mg.

Beaker Tare Weight: 101610.1 mg.

Acetone Rinse Net Weight: 725.6 mg.

Minus Blank Correction: 2.8 mg.

Corrected Net Weight: 722.8 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79159

Sample No.: 3064

Final Filter Weight: 15799 mg.

Filter Tare Weight: 1221.8 mg.

Filter Net Weight: 358.1 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 358.1 mg.

Sample Weight From Acetone Rinse: 722.8 mg.

Total Sample Weight: 1080.9 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-5 Date 7/31/80 By DAB/2nd Calc. 8-14-80 [illegible]

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3087 Final Beaker Weight: 1089659 mg.

Acetone Volume: 100 ml. Beaker Tare Weight: 1089658 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.1 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.1 mg. ÷ 100 ml. = 0.001 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.5 mg/ml) x 100

% Blank Residual = 0.001 mg/ml ÷ 785.5 mg/ml x 100 = 0.00013 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.001 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = ____ mg/ml

==========

Run No.: Bec-ESP-A-5 ACETONE RINSE Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3086

Acetone Volume: 370 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction =

370 ml. x 0.001 mg/ml = 0.4 mg.

Final Beaker Weight: 1002961 mg.

Beaker Tare Weight: 993310 mg.

Acetone Rinse Net Weight: 965.1 mg.

Minus Blank Correction: 0.4 mg.

Corrected Net Weight: 964.7 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79168

Sample No.: 3085

Final Filter Weight: 1591.9 mg.

Filter Tare Weight: 1159.5 mg.

Filter Net Weight: 432.4 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 432.4 mg.

Sample Weight From Acetone Rinse: 964.7 mg.

Total Sample Weight: 1397.1 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-IA-6 Date 7/31/80 By DAB/ 2nd Calc. 8-14-80 PHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3097 Final Beaker Weight: 110765.5 mg.

Acetone Volume: 101 ml. Beaker Tare Weight: 110765.2 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.3 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.3 mg. ÷ 101 ml. = 0.00297 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.00297 mg/ml ÷ 7849 mg/ml x 100 = 0.00038 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00297 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No.: Bec-ESP-A-6 **ACETONE RINSE** Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3096

Acetone Volume: 430 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 430 ml. x 0.0097 mg/ml = 1.3 mg.

Final Beaker Weight: 108793.6 mg.

Beaker Tare Weight: 107959.3 mg.

Acetone Rinse Net Weight: 834.3 mg.

Minus Blank Correction: 1.3 mg.

Corrected Net Weight: 833.0 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79172

Sample No.: 3090

Final Filter Weight: 1528.1 mg.

Filter Tare Weight: 1148.9 mg.

Filter Net Weight: 379.2 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 379.2 mg.

Sample Weight From Acetone Rinse: 833.0 mg.

Total Sample Weight: 1212.2 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec ESP-A-7 Date 7/31/80 By DAB / 2nd Calc. 8/13-14/80 RHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3109 Final Beaker Weight: 99012.2 mg.

Acetone Volume: 116 ml. Beaker Tare Weight: 99011.8 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.4 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.4 mg. ÷ 116 ml. = 0.00345 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.00345 mg/ml ÷ 7849 mg/ml x 100 = 0.00044 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00345 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No: Bep-ESP M-7 **ACETONE RINSE** Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3110

Acetone Volume: 430 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 430 ml. x 0.00345 mg/ml = 1.5 mg.

Final Beaker Weight: 101380.1 mg.

Beaker Tare Weight: 100909.0 mg.

Acetone Rinse Net Weight: 471.1 mg.

Minus Blank Correction: 1.5 mg.

Corrected Net Weight: 469.6 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79174

Sample No.: 3108

Final Filter Weight: 1442.4 mg.

Filter Tare Weight: 1193.5 mg.

Filter Net Weight: 248.9 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 248.9 mg.

Sample Weight From Acetone Rinse: 469.6 mg.

Total Sample Weight: 718.5 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-8 Date 7/31/80 By DAB / 2nd Calc. 8/13-14/80 PHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3120 Final Beaker Weight: 97840.7 mg.

Acetone Volume: 98 ml. Beaker Tare Weight: 97840.2 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.5 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.5 mg. ÷ 98 ml. = 0.0051 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.0051 mg/ml ÷ 7849 mg/ml x 100 = 0.00065 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.0051 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No. ESP-A-8

ACETONE RINSE

Project No. 80019

Visual Observations:

By: DAB

Sample No.: 3124

Acetone Volume: 350 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 350 ml. x 0.0051 mg/ml = 1.8 mg.

Final Beaker Weight: 109970.4 mg.

Beaker Tare Weight: 109462.9 mg.

Acetone Rinse Net Weight: 507.5 mg.

Minus Blank Correction: 1.8 mg.

Corrected Net Weight: 505.7 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations:

By: DAB

Filter No: 79178

Sample No.: 3119

Final Filter Weight: 1443.0 mg.

Filter Tare Weight: 1140.2 mg.

Filter Net Weight: 302.8 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 302.8 mg.

Sample Weight From Acetone Rinse: 505.7 mg.

Total Sample Weight: 808.5 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-9 Date 7/31/80 By DAB / 2nd Calc. 8/13-19/80 [illegible]

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3132 Final Beaker Weight: 100576.2 mg.

Acetone Volume: 64 ml. Beaker Tare Weight: 100575.9 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.3 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.3 mg. ÷ 64 ml. = 0.00469 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.00469 mg/ml ÷ 784.9 mg/ml x 100 = 0.000598 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00469 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

ACETONE RINSE

Run No. BEC-ESP-A-9 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3143

Acetone Volume: 470 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 470 ml. x 0.00469 mg/ml = 2.2 mg.

Final Beaker Weight: 109021.6 mg.

Beaker Tare Weight: 108435.6 mg.

Acetone Rinse Net Weight: 586.0 mg.

Minus Blank Correction: 2.2 mg.

Corrected Net Weight: 583.8 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 80040

Sample No.: 3134

Final Filter Weight: 1424.0 mg.

Filter Tare Weight: 1100.4 mg.

Filter Net Weight: 323.6 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 323.6 mg.

Sample Weight From Acetone Rinse: 583.8 mg.

Total Sample Weight: 907.4 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-A-10 Date 7/31/80 By DAB

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3147 Final Beaker Weight: 104846.5 mg.

Acetone Volume: 102 ml. Beaker Tare Weight: 104846.4 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.1 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.1 mg. ÷ 102 ml. = 0.00098 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.00098 mg/ml ÷ 784.9 mg/ml x 100 = 0.0012 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00098 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

ACETONE RINSE

Run No. Bec-ESP-A-10 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3149

Acetone Volume: 540 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 540 ml. x 0.00098 mg/ml = 0.5 mg.

Final Beaker Weight: 102737.5 mg.

Beaker Tare Weight: 101865.0 mg.

Acetone Rinse Net Weight: 872.5 mg.

Minus Blank Correction: 0.5 mg.

Corrected Net Weight: 872.0 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 80043

Sample No.: 3150

Final Filter Weight: 1472.8 mg.

Filter Tare Weight: 1128.1 mg.

Filter Net Weight: 344.7 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 344.7 mg.

Sample Weight From Acetone Rinse: 872.0 mg.

Total Sample Weight: 1216.7 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, PH.D.,
Analytical Chemist

ESP-B-(1-10)

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-1 Date 7/29/80 By DAB/2nd Calc. 8/13-14/80 - PAM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3022 Final Beaker Weight: 1089663 mg.

Acetone Volume: 190 ml. Beaker Tare Weight: 1089661 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.2 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.2 mg. ÷ 190 ml. = 0.00105 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.7 mg/ml) x 100

% Blank Residual = 0.00105 mg/ml ÷ 785.7 mg/ml x 100 = 0.00013 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00105 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = ____ mg/ml

==========

Run No. Bec-ESP-B-1 ACETONE RINSE Project No. : 80019

Visual Observations: By: DAB

Sample No.: 3027.5

Acetone Volume: 443 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 443 ml. x 0.00125 mg/ml = 0.5 mg.

Final Beaker Weight: 101399.3 mg.

Beaker Tare Weight: 100700.3 mg.

Acetone Rinse Net Weight: 699.0 mg.

Minus Blank Correction: 0.5 mg.

Corrected Net Weight: 698.5 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79148

Sample No.: 3027

Final Filter Weight: 13869 mg.

Filter Tare Weight: 1122.5 mg.

Filter Net Weight: 264.4 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 264.4 mg.

Sample Weight From Acetone Rinse: 698.5 mg.

Total Sample Weight: 962.9 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-2 Date 7/31/80 By DAB/2nd Calc. 8-14-80 PMM

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3031 Final Beaker Weight: 101854.6 mg.

Acetone Volume: 180 ml. Beaker Tare Weight: 101854.0 mg.

Any Noted Acetone Loss: ND Acetone Blank Net Weight: 0.6 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.6 mg. ÷ 180 ml. = 0.00333 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.00333 mg/ml ÷ 7849 mg/ml x 100 = 0.0042%

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00333 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = ____ mg/ml

ACETONE RINSE

Run No. Bec-ESP-B-2 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3038

Acetone Volume: 350 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 350 ml. x 0.00333 mg/ml = 1.2 mg.

Final Beaker Weight: 101163.5 mg.

Beaker Tare Weight: 100828.2 mg.

Acetone Rinse Net Weight: 335.3 mg.

Minus Blank Correction: 1.2 mg.

Corrected Net Weight: 334.1 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79150

Sample No.: 3029

Final Filter Weight: 1257.1 mg.

Filter Tare Weight: 1108.7 mg.

Filter Net Weight: 148.4 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 148.4 mg.

Sample Weight From Acetone Rinse: 334.1 mg.

Total Sample Weight: 482.5 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

August 6, 1980

Analytical Log

Due to a malfunctioning valve in one of the desiccators the acetone evaporations from Day 2 may have been cross-contaminated, and some particulate lost in the desiccator. ESP-B-2 acetone rinse beaker was closest to the valve. Beakers ESP-A-2 acetone rinse and ESP-B-2 acetone blank were the only 2 beakers immediatly adjacent to ESP-B-2 beaker. They received some loose dust from the ESP-B-2 spill. This loose dust, however, was deposited on top of firmly caked particulate matter in ESP-A-2 acetone rinse beaker and could be removed simply by pouring the loose dust back into ESP-B-2 acetone rinse beaker: loose dust also fell into ESP-B-2 acetone blank (empty) and was returned to ESP-B-2 acetone rinse in the same manner. The remainder of the loose dust was deposited within the desiccator itself and was returned to ESP-B-2 acetone rinse beaker using a camel hair brush and tweezers, although some particulate loss did occur. Below is a list of all beakers that were in the desiccator at the time of the spill, and the amount of contamination that each received:

Stk-2 Acetone Rinse	-	No Contamination
Stk-2 Acetone Blank	-	No Contamination
ESP-A-2 Acetone Rinse	-	Some Contamination
ESP-A-2 Acetone Blank	-	No Contamination
ESP-B-2 Acetone Rinse	-	Loss of Particulate
ESP-B-2 Acetone Blank	-	Some Contamination

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-3 Date 7/31/80 By DAB/2nd Calc. 8/13-14/80 [illegible]

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3049 Final Beaker Weight: 104807.8 mg.

Acetone Volume: 187 ml. Beaker Tare Weight: 104807.6 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.2 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.2 mg. ÷ 187 ml. = 0.00107 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.7 mg/ml) x 100

% Blank Residual = 0.00107 mg/ml ÷ 785.7 mg/ml x 100 = 0.00014 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00107 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No. Bec-ESP-B-3 ACETONE RINSE Project No. 80019

Visual Observations: By: DAB

Sample No.: 3047

Acetone Volume: 470 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 470 ml. x 0.00107 mg/ml = 0.5 mg.

Final Beaker Weight: 1043545 mg.

Beaker Tare Weight: 1092358 mg.

Acetone Rinse Net Weight: 1118.7 mg.

Minus Blank Correction: 0.5 mg.

Corrected Net Weight: 1118.2 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79154

Sample No.: 3045

Final Filter Weight: 1572.7 mg.

Filter Tare Weight: 1175.0 mg.

Filter Net Weight: 397.7 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 397.7 mg.

Sample Weight From Acetone Rinse: 1118.2 mg.

Total Sample Weight: 1515.9 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. ESP-B-4 Date 7/31/80 By DAB/ 2nd Calc. 8/13-14/80 PAM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3073 Final Beaker Weight: 101854.7 mg.

Acetone Volume: 120 ml. Beaker Tare Weight: 101853.9 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.8 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.8 mg. ÷ 120 ml. = 0.00667 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.00667 mg/ml ÷ 7849 mg/ml x 100 = 0.00085 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00667 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No.: Bec-ESP-B-4 **ACETONE RINSE** Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3071 ①

Acetone Volume: 450 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction =

450 ml. x 0.00667 mg/ml = 3.0 mg.

Final Beaker Weight: 98431.6 mg.

Beaker Tare Weight: 97820.7 mg.

Acetone Rinse Net Weight: 6109 mg.

Minus Blank Correction: 3.0 mg.

Corrected Net Weight: 6079 mg.

Any Noted Acetone Loss: none

① glass from broken funnel in sample

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79167

Sample No.: 3057

Final Filter Weight: 1499.2 mg.

Filter Tare Weight: 1207.7 mg.

Filter Net Weight: 291.5 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 291.5 mg.

Sample Weight From Acetone Rinse: 6079 mg.

Total Sample Weight: 899.4 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-5 Date 7/31/80 By DAB / 2nd Calc. 8-19-80 PWM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3075 Final Beaker Weight: 91942.7 mg.

Acetone Volume: 158 ml. Beaker Tare Weight: 91942.6 mg.

Any Noted Acetone Loss: _____ Acetone Blank Net Weight: 0.1 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.1 mg. ÷ 158 ml. = 0.0006 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.5 mg/ml) x 100

% Blank Residual = 0.0006 mg/ml ÷ 785.5 mg/ml x 100 = 0.00008%

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.0006 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

ACETONE RINSE

Run No. Bec-ESP-B-S

Project No. 80019

Visual Observations:

By: DAB

Sample No.: 3074

Final Beaker Weight: 102711.7 mg.

Acetone Volume: 368 ml.

Beaker Tare Weight: 101956.4 mg.

Blank Correction = Acetone Volume x Allowable Blank Residual

Acetone Rinse Net Weight: 755.3 mg.

Minus Blank Correction: 0.2 mg.

Blank Correction =

368 ml. x 0.0006 mg/ml = 0.2 mg.

Corrected Net Weight: 755.1 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations:

By: DAB

Filter No: 79169

Final Filter Weight: 1485.0 mg.

Sample No.: 3072

Filter Tare Weight: 1171.5 mg.

Filter Net Weight: 313.5 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 313.5 mg.

Sample Weight From Acetone Rinse: 755.1 mg.

Total Sample Weight: 1068.6 mg.

Approved By: Gary H. Revlett

Date: 8/14/86

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-6 Date 7/31/80 By DAB/ 2nd Calc. 8-14-80 PWM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3099 Final Beaker Weight: 103777.7 mg.

Acetone Volume: 355 ml. Beaker Tare Weight: 103777.2 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.5 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.5 mg. ÷ 355 ml. = 0.00141 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.0014 mg/ml ÷ 7849 mg/ml x 100 = 0.00018%

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00141 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No. Bec-FSP B-6

ACETONE RINSE

Project No. 8009

Visual Observations:

By: DAB

Sample No.: 3098

Acetone Volume: 425 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 425 ml. x 0.0044 mg/ml = 0.6 mg.

Final Beaker Weight: 102742.2 mg.

Beaker Tare Weight: 101452.9 mg.

Acetone Rinse Net Weight: 1289.3 mg.

Minus Blank Correction: 0.6 mg.

Corrected Net Weight: 1288.7 mg.

Any Noted Acetone Loss:

FILTER WEIGHT

Visual Observations:

By: DAB

Filter No: 7170

Sample No.: 3078

Final Filter Weight: 1688.7 mg.

Filter Tare Weight: 1189.2 mg.

Filter Net Weight: 499.5 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 499.5 mg.

Sample Weight From Acetone Rinse: 1288.7 mg.

Total Sample Weight: 1788.2 mg.

Approved By: Gary H. Revlett, Ph.D., Analytical Chemist

Date: 8/14/90

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-7 Date 7/31/80 By DAB/2nd Calc. 8/13-14/80 RHM

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3102 Final Beaker Weight: 110446.0 mg.

Acetone Volume: 130 ml. Beaker Tare Weight: 110445.1 mg.

Any Noted Acetone Loss: _____ Acetone Blank Net Weight: 0.9 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.9 mg. ÷ 130 ml. = 0.0069 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.0069 mg/ml ÷ 784.9 mg/ml x 100 = 0.00088 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.0069 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

ACETONE RINSE

Run No. BeaESPB-7 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3103

Acetone Volume: 400 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 400 ml. x 0.009 mg/ml = 2.8 mg.

Final Beaker Weight: 101332.8 mg.

Beaker Tare Weight: 100700.1 mg.

Acetone Rinse Net Weight: 632.7 mg.

Minus Blank Correction: 2.8 mg.

Corrected Net Weight: 629.9 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79175

Sample No.: 3092

Final Filter Weight: 15466 mg.

Filter Tare Weight: 12548 mg.

Filter Net Weight: 291.8 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 291.8 mg.

Sample Weight From Acetone Rinse: 629.9 mg.

Total Sample Weight: 921.7 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-8 Date 7/31/80 By DAB/2nd Calc. 8/13-14/86 PWM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3122 Final Beaker Weight: 102145.2 mg.

Acetone Volume: 110 ml. Beaker Tare Weight: 102144.8 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.4 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.4 mg. ÷ 110 ml. = 0.0036 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.0036 mg/ml ÷ 7849 mg/ml x 100 = 0.00046%

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.0036 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

ACETONE RINSE

Run No. Bec ESP-B-8 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3118

Acetone Volume: 375 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 375 ml. x 0.0036 mg/ml = 1.4 mg.

Final Beaker Weight: 97921.2 mg.

Beaker Tare Weight: 97400.9 mg.

Acetone Rinse Net Weight: 520.3 mg.

Minus Blank Correction: 1.4 mg.

Corrected Net Weight: 518.9 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79176

Sample No.: 3105

Final Filter Weight: 1469.5 mg.

Filter Tare Weight: 1182.8 mg.

Filter Net Weight: 286.7 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 286.7 mg.

Sample Weight From Acetone Rinse: 518.9 mg.

Total Sample Weight: 805.6 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-9 Date 7/31/80 By DAB/ 2nd Calc. 9/13-15/80 DAB

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3136 Final Beaker Weight: 104807.8 mg.

Acetone Volume: 226 ml. Beaker Tare Weight: 104807.7 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.1 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.1 mg. ÷ 226 ml. = 0.000442 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.000442 mg/ml ÷ 784.9 mg/ml x 100 = 0.000056 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.000442 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

Run No. Bec-ESP-B-9 ACETONE RINSE Project No. 80019

Visual Observations: By: DAB

Sample No.: 3137

Acetone Volume: 540 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 540 ml. x 0.000442 mg/ml = 0.2 mg.

Final Beaker Weight: 100576.6 mg.

Beaker Tare Weight: 99650.0 mg.

Acetone Rinse Net Weight: 926.6 mg.

Minus Blank Correction: 0.2 mg.

Corrected Net Weight: 926.4 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79179

Sample No.: 3117

Final Filter Weight: 1459.1 mg.

Filter Tare Weight: 1143.3 mg.

Filter Net Weight: 315.8 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 315.8 mg.

Sample Weight From Acetone Rinse: 926.2 mg.

Total Sample Weight: 1242.0 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-ESP-B-10 Date 7/31/80 By DAB

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3145 Final Beaker Weight: 104248.2 mg.

Acetone Volume: 130 ml. Beaker Tare Weight: 104247.7 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.5 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.5 mg. ÷ 130 ml. = 0.00385 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.00385 mg/ml ÷ 784.9 mg/ml x 100 = 0.00049 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00385 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

ACETONE RINSE

Run No. Bec-ESP-B-10 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3144

Acetone Volume: 465 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 465 ml. x 0.00385 mg/ml = 1.8 mg.

Final Beaker Weight: 109907.3 mg.

Beaker Tare Weight: 109414.2 mg.

Acetone Rinse Net Weight: 493.1 mg.

Minus Blank Correction: 1.8 mg.

Corrected Net Weight: 491.3 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 80044

Sample No.: 3142

Final Filter Weight: 1363.4 mg.

Filter Tare Weight: 1144.5 mg.

Filter Net Weight: 218.9 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 218.9 mg.

Sample Weight From Acetone Rinse: 491.3 mg.

Total Sample Weight: 710.2 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

STK-(1-10)

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec Stk-1 Date 7/29/80 By DAB / 2nd Calc 8/13-14 - AM
OK CB

ACETONE BLANK

Visual Observations: Clear By: DAB

Sample No.: 3020 Final Beaker Weight: 1085526 mg.

Acetone Volume: 208 ml. Beaker Tare Weight: 108552.4 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.2 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.2 mg. ÷ 208 ml. = 0.00096 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.7 mg/ml) x 100

% Blank Residual = 0.00096 mg/ml ÷ 785.7 mg/ml x 100 = 0.00012 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00096 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

ACETONE RINSE

Run No. Bec. Stk-1 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3023

Acetone Volume: 454 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 454 ml. x 0.0009 mg/ml = 0.4 mg.

Final Beaker Weight: 107167.9 mg.

Beaker Tare Weight: 107144.0 mg.

Acetone Rinse Net Weight: 23.9 mg.

Minus Blank Correction: 0.4 mg.

Corrected Net Weight: 23.5 mg.

Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79146

Sample No.: 3028

Final Filter Weight: 1213.6 mg.

Filter Tare Weight: 1157.3 mg.

Filter Net Weight: 56.3 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 56.3 mg.

Sample Weight From Acetone Rinse: 23.5 mg.

Total Sample Weight: 79.8 mg.

Approved By: Gary H. Revlett Date: 8/14/85

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 8001A

Run No. Bec-Stk-2 Date 7/29/80 By DAB/2nd Calc. 9-14-80 BWM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3043 Final Beaker Weight: 99309.5 mg.

Acetone Volume: 140 ml. Beaker Tare Weight: 99309.2 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.3 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.3 mg. ÷ 140 ml. = 0.002143 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.002143 mg/ml ÷ 784.9 mg/ml x 100 = 0.00027%

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.002143 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No.: Bec-Stk-2 **ACETONE RINSE** Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3037

Acetone Volume: 370 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 370 ml. x 0.0021 mg/ml = 0.8 mg.

Final Beaker Weight: 108104.4 mg.

Beaker Tare Weight: 108069.4 mg.

Acetone Rinse Net Weight: 35.0 mg.

Minus Blank Correction: 0.8 mg.

Corrected Net Weight: 34.2 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79151

Sample No.: 3039

Final Filter Weight: 1291.1 mg.

Filter Tare Weight: 1232.6 mg.

Filter Net Weight: 58.5 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 58.5 mg.

Sample Weight From Acetone Rinse: 32.4 mg.

Total Sample Weight: 90.9 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 8001A

Run No. Bec-Stk-3 Date 7/31/80 By DAB/2nd Calc. 8/13-14/80 PHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3057 Final Beaker Weight: 1086726 mg.

Acetone Volume: 192 ml. Beaker Tare Weight: 1086723 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.3 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.3 mg. ÷ 192 ml. = 000156 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.7 mg/ml) x 100

% Blank Residual = 0.00156 mg/ml ÷ 7857 mg/ml x 100 = 0.00020 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00156 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

ACETONE RINSE

Run No. Bec-Stk-3 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3058

Acetone Volume: 450 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 450 ml. x 0.00156 mg/ml = 0.7 mg.

Final Beaker Weight: 107517.4 mg.

Beaker Tare Weight: 107481.0 mg.

Acetone Rinse Net Weight: 36.4 mg.

Minus Blank Correction: 0.7 mg.

Corrected Net Weight: 35.7 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79153

Sample No.: 3052

Final Filter Weight: 1277.3 mg.

Filter Tare Weight: 1216.3 mg.

Filter Net Weight: 61.0 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 61.0 mg.

Sample Weight From Acetone Rinse: 35.7 mg.

Total Sample Weight: 96.7 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-4 Date 7/31/80 By DAB / 2nd Calc. 8/13-14/80 RJM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3068 Final Beaker Weight: 111083.8 mg.

Acetone Volume: 185 ml. Beaker Tare Weight: 1110829 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.9 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.9 mg. ÷ 185 ml. = 0.004865 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.004865 mg/ml ÷ 784.9 mg/ml x 100 = 0.00062 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.004865 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No.: Bec-Stk-4 ACETONE RINSE Project No.: 80019

Visual Observations: By: DAB

Sample No.: 3069 Final Beaker Weight: 101957.6 mg.

Acetone Volume: 340 ml. Beaker Tare Weight: 101923.3 mg.

Blank Correction = Acetone Volume x Acetone Rinse Net Weight: 34.3 mg.

Allowable Blank Residual Minus Blank Correction: 1.7 mg.

Blank Correction = Corrected Net Weight: 32.6 mg.

340 ml. x 0004865 mg/ml = 1.7 mg. Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79158 Final Filter Weight: 1290.6 mg.

Sample No.: 3060 Filter Tare Weight: 1232.0 mg.

Filter Net Weight: 58.6 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 58.6 mg.

Sample Weight From Acetone Rinse: 32.6 mg.

Total Sample Weight: 91.2 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-5 Date 7/31/80 By DAB/2nd Calc. 8-19-80 [illegible]

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3084 Final Beaker Weight: 102109.9 mg.

Acetone Volume: 204 ml. Beaker Tare Weight: 102109.5 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.4 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.4 mg. ÷ 204 ml. = 0.00196 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (785.5 mg/ml) x 100

% Blank Residual = 0.00196 mg/ml ÷ 785.5 mg/ml x 100 = 0.00025 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00196 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

ACETONE RINSE

Run No. Bec-Stk-5 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3088

Acetone Volume: 300 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 300 ml. x 0.0096 mg/ml = 0.6 mg.

Final Beaker Weight: 109782.8 mg.

Beaker Tare Weight: 109752.2 mg.

Acetone Rinse Net Weight: 30.6 mg.

Minus Blank Correction: 0.6 mg.

Corrected Net Weight: 30.0 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79160

Sample No.: 3077

Final Filter Weight: 12570 mg.

Filter Tare Weight: 11967 mg.

Filter Net Weight: 60.3 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 60.3 mg.

Sample Weight From Acetone Rinse: 30.0 mg.

Total Sample Weight: 90.3 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-6 Date 7/31/80 By DAB/2nd Calc. 8-14-80 [illegible]

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3100 Final Beaker Weight: 101272.9 mg.

Acetone Volume: 189 ml. Beaker Tare Weight: 101272.1 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.8 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.8 mg. ÷ 189 ml. = 0.0042 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.0042 mg/ml ÷ 784.9 mg/ml x 100 = 0.00054 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.0042 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = ____ mg/ml

==========

ACETONE RINSE

Run No. Bec-Stk-6 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3101

Acetone Volume: 325 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 325 ml. x 0.0042 mg/ml = 1.4 mg.

Final Beaker Weight: 100926.0 mg.

Beaker Tare Weight: 100888.2 mg.

Acetone Rinse Net Weight: 37.8 mg.

Minus Blank Correction: 1.4 mg.

Corrected Net Weight: 36.4 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79171

Sample No.: 3079

Final Filter Weight: 1266.9 mg.

Filter Tare Weight: 1212.0 mg.

Filter Net Weight: 54.9 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 54.9 mg.

Sample Weight From Acetone Rinse: 36.4 mg.

Total Sample Weight: 91.3 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-7 Date 7/31/80 By DAB/2nd Calc. 8/13-14/80 PHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3114 Final Beaker Weight: 108553.8 mg.

Acetone Volume: 180 ml. Beaker Tare Weight: 108553.1 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.7 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.7 mg. ÷ 180 ml. = 0.00389 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.00389 mg/ml ÷ 7849 mg/ml x 100 = 0.00049%

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00389 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

Run No.: Bec-Stk-7 **ACETONE RINSE** Project No.: 86019

Visual Observations: By: DAB

Sample No.: 3115 Final Beaker Weight: 101120.5 mg.

Acetone Volume: 375 ml. Beaker Tare Weight: 101082.1 mg.

Blank Correction = Acetone Volume x Acetone Rinse Net Weight: 38.4 mg.

Allowable Blank Residual Minus Blank Correction: 1.5 mg.

Blank Correction = Corrected Net Weight: 36.9 mg.

375 ml. x 0.00389 mg/ml = 1.5 mg. Any Noted Acetone Loss: NONE

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79173 Final Filter Weight: 1251.2 mg.

Sample No.: 3107 Filter Tare Weight: 1207.0 mg.

Filter Net Weight: 44.2 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 44.2 mg.

Sample Weight From Acetone Rinse: 36.9 mg.

Total Sample Weight: 81.1 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-8 Date 7/31/80 By DAB / 2nd Calc. 8/13-14/80 PHM

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3126 Final Beaker Weight: 996344 mg.

Acetone Volume: 186 ml. Beaker Tare Weight: 996343 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.1 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.1 mg. ÷ 186 ml. = 0.00054 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.00054 mg/ml ÷ 784.9 mg/ml x 100 = 0.000069 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.00054 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

ACETONE RINSE

Run No. Bec Stk-8 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3125

Acetone Volume: 260 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction =

260 ml. x 0.00054 mg/ml = 0.1 mg.

Final Beaker Weight: 101057.6 mg.

Beaker Tare Weight: 101028.4 mg.

Acetone Rinse Net Weight: 29.2 mg.

Minus Blank Correction: 0.1 mg.

Corrected Net Weight: 29.1 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 79177

Sample No.: 3123

Final Filter Weight: 1185.2 mg.

Filter Tare Weight: 1138.0 mg.

Filter Net Weight: 47.2 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 47.2 mg.

Sample Weight From Acetone Rinse: 29.1 mg.

Total Sample Weight: 76.3 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-9 Date 7/31/80 By DAB/ 2nd Calc 8/13-14/80 PAM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3139 Final Beaker Weight: 97634.0 mg.

Acetone Volume: 94 ml. Beaker Tare Weight: 97633.3 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.7 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.7 mg. ÷ 94 ml. = 0.007447 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.007447 mg/ml ÷ 784.9 mg/ml x 100 = 0.00095 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.007447 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

ACETONE RINSE

Run No. Bec-Stk-9 Project No. 80019

Visual Observations: By: DAB

Sample No.: 3138

Acetone Volume: 292 ml.

Blank Correction = Acetone Volume x Allowable Blank Residual

Blank Correction = 292 ml. x .0007447 mg/ml = 2.2 mg.

Final Beaker Weight: 1066331 mg.

Beaker Tare Weight: 1066000 mg.

Acetone Rinse Net Weight: 33.1 mg.

Minus Blank Correction: 2.2 mg.

Corrected Net Weight: 30.9 mg.

Any Noted Acetone Loss: none

FILTER WEIGHT

Visual Observations: By: DAB

Filter No: 80044

Sample No.: 3130

Final Filter Weight: 12039 mg.

Filter Tare Weight: 11364 mg.

Filter Net Weight: 67.5 mg.

SAMPLE WEIGHT

Sample Weight From Filter: 67.5 mg.

Sample Weight From Acetone Rinse: 30.9 mg.

Total Sample Weight: 98.4 mg.

Approved By: Gary H. Revlett Date: 8/14/80

Gary H. Revlett, Ph.D.,
Analytical Chemist

page 2 of 2

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-10 Date 7/31/80 By DAB

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3154 Final Beaker Weight: 108672.2 mg.

Acetone Volume: 188 ml. Beaker Tare Weight: 108672.0 mg.

Any Noted Acetone Loss: NONE Acetone Blank Net Weight: 0.2 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.2 mg. ÷ 188 ml. = 0.0011 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (7849 mg/ml) x 100

% Blank Residual = 0.0011 mg/ml ÷ 7849 mg/ml x 100 = 0.0014 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.0011 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========

KENVIRONS, INC.
EPA METHOD 5 LABORATORY
DATA SHEET

Client Bechtel Project No. 80019

Run No. Bec-Stk-9 Date 7/31/80 By DAB/ 2nd Calc. 8/13-14/80 PHM

==========

ACETONE BLANK

Visual Observations: By: DAB

Sample No.: 3139 Final Beaker Weight: 97634.0 mg.

Acetone Volume: 94 ml. Beaker Tare Weight: 97633.3 mg.

Any Noted Acetone Loss: none Acetone Blank Net Weight: 0.7 mg.

Blank Residual = Acetone Blank Net Weight ÷ Acetone Volume

Blank Residual = 0.7 mg. ÷ 94 ml. = 0.007447 mg/ml

% Blank Residual = Blank Residual ÷ Density of Acetone (784.9 mg/ml) x 100

% Blank Residual = 0.007447 mg/ml ÷ 784.9 mg/ml x 100 = 0.00095 %

If Blank Residual is less than 0.001% then:

Allowable Blank Residual = Blank Residual

Allowable Blank Residual = 0.007447 mg/ml

If % Blank Residual is greater than or equal to 0.001% then:

Allowable Blank Residual = Density of Acetone x 0.00001 = _____ mg/ml

==========